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ANNUAL REPORT

OF THE

STATE BOARD OF HORTICULTURE

OF THE

STATE OF CALIFORNIA,

FOR 1892.

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REPORT

OF

B. M. LELONG,

Secretary, and Chief Horticultural Officer.

CALIFORNIA HORTICULTURALLY.

REPORT OF B. M. LELONG, SECRETARY, AND CHIEF HORTICULTURAL OFFICER.

CHAPTER I.

GEOGRAPHICAL.

California occupies about one half of the western coast of the United States. It extends from latitude 32° 50′ on the south to 42° on the north, a total length of about 800 miles, reaching through nine and a half degrees of latitude. Its average width is about 200 miles. It is only by comparison that the significance of these figures can be understood. The same length on the Atlantic takes in the coast of Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, Virginia, and North and South Carolina. The area of California is equal to the combined area of Massachusetts, New York, Pennsylvania, Maryland, and Virginia. There is one valley in the State, the San Joaquin, in which, were all the New England States placed, only about one half of Maine would lap onto the foothills.

The most westerly land in California is Cape Mendocino, whence the coast trends to the southeast, with a westerly convexity, to San Diego Bay. The distance between the extreme northwest and southeast corners, from Crescent City, in Del Norte County, to Yuma, in San Diego County, is 775 miles, and the greatest width, from Point Arguello, in Santa Barbara, to The Needles, in San Bernardino County, is 235 miles, and its smallest width, from San Francisco to the southern end of Lake Tahoe, 148 miles. The total area of the State is 158,360 square miles. Its land area is 155,980 square miles, ranking next to Texas, in point of size, among the States of the Union.

In a territory so extensive as California, with altitudes ranging from 300 feet below sea-level to 15,000 feet above, with several ocean currents touching its coast at different points, and mountain ranges extending its whole length, there must of necessity be a great diversity of soil and climate, and an equally great diversity of production. Within this area we find fruits of all parts of the earth, from the tropical, growing in the sheltered slopes of the lower levels, to the hardy fruits of the North Temperate Zone.

This area covers land the most fertile and the most barren on earth, and while a considerable portion of the State is unavailable for agricultural purposes—notably the Mohave Desert and the upper ranges of the Sierra Nevada—there is enough arable land left to furnish homes for an immense population and vast areas of land comprised in the valleys, the foothills, and the valleys of the higher mountains, which now lie idle, will yet be brought under cultivation, and many varieties of fruit will grow on lands now left to the chaparral.

CHAPTER II.

TOPOGRAPHICAL.

The physical features of the State are as varied as are its geographical peculiarities, and comprise mountains, valleys, plains, and desert. Its topography includes the highest and the lowest land in the United States, the most fertile of valleys and the most forbidding waste, copious streams fed by everlasting snow, vast extents upon which no stream is found, glaciers and fields of eternal snow, valleys upon which snow never falls. The topographical features of the State have a direct influence upon the climate, which is here largely a question of altitude and physical surroundings, and necessarily varies materially in different localities within a short distance of each other. As climate and altitude are interdependent, and both have a direct bearing upon horticultural pursuits, a brief account of the chief topographical features of the State as a whole is here given.

The prominent features of California are the two great mountain chains, extending nearly the entire length of the State. The Sierra Nevada on the east, with its snow-capped mountains, its numerous valleys, and its fertile foothills, extending from Kern County on the south to Siskiyou County on the north;. on the west the great Coast Range, or rather series of ranges, of much less altitude than their opposite neighbors, and bordering the seacoast the entire length of the State. Between the two lie the two great valleys—or rather the one great valley—of the Sacramento and the San Joaquin. The former is drained by the Sacramento River, which flows from the north to the south; the latter by the San Joaquin, which has its rise in the southern end of the valley, and flows from the south to the north, joining the Sacramento in Suisun Bay, near the geographical middle of the State, flowing through the straits of Carquinez into the bay of San Francisco, thence through the Golden Gate to the Pacific Ocean. These rivers receive nearly all their water from the Sierra Nevada Range, the streams flowing landward from the Coast Range being insignificant, and most of them drying up during the summer season. The main drainage of the Coast Range is seaward, and many small rivers find their outlet to the ocean from their western slope.

The principal rivers feeding the Sacramento are the Pitt River, which rises in Modoc County in two branches, known as the North and South Forks. These flow southwesterly to Fall River City, in Shasta County, where they unite with the waters of Fall River, a very large stream which rises in one vast body from the lava beds near Dana, after uniting with the the waters of the McCloud River. Pitt River unites with the Sacramento near Kennet, in Shasta County. The next most important tributary of the Sacramento is the Feather River, which has its rise in a number of large springs in Plumas County, and drains the numerous valleys of that county. Three large branches of this river rise here, known as the North, Middle, and South Forks, each receiving numerous tributary streams on their way to the plains. Near Marysville the Yuba River, having its source in Nevada and Sierra Counties, joins the Feather. Further south Bear River, draining a large part of Nevada County, finds its junction with the same river, which is lost in the Sacramento at Vernon, some 18 miles north of Sacramento City. At Sacramento the

American River, which drains El Dorado County, is the last important tributary of the Sacramento.

A very large number of important streams, with an extensive drainage area on the Sierra Nevada Range, in the counties of El Dorado, Amador, Alpine, Calaveras, Tuolumne, Mariposa, and Fresno, feed the San Joaquin River. These are the Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, and Fresno Rivers. Other rivers of the San Joaquin Valley are Kings, Kaweah, Tule, and Kern; these receive numerous tributaries, and find their outlet in Tulare Lake, which in seasons of high water overflows into the San Joaquin River. Of late years the water of these streams has been diverted for irrigation, and is used to feed a large number of irrigating canals. As a result these streams cannot be included in the tributaries of the San Joaquin River.

The length of the Sacramento Valley, from its head, a few miles above Red Bluff, to the Calaveras River, is about 160 miles, and its width varies from 7 miles opposite Red Bluff to 15 miles at the county line of Tehama County, where it suddenly expands westward, assuming its average width of 40 miles, or a little over. Northwest of Woodland, in Yolo County, it is narrowed by a promontory of red foothill land projecting into the plain from the Coast Range to about 33 miles, but below this it rapidly widens again to its maximum width of 60 miles, opposite Suisun Bay. Its total area is about 6,200 square miles.

That portion of the great valley traversed by the San Joaquin and its tributaries constitutes about three fifths of the whole, its area from the southern end to the Calaveras River, a distance of 240 miles, being about 11,000 square miles. The southern end of the valley is formed into a separate basin by a low ridge which traverses the valley in the southern part of Fresno, thus forming the Tulare and San Joaquin basins. The Kaweah and Kern Rivers flow for a long part of their distance over an almost level country, and form a delta with their numerous branches as they spread over the plain, in which they are lost for the greater part of the year. These deltas are very fertile, and are known as the Visalia Delta and Kern Island.

But few streams of any importance rise in the Coast Range. One of the principal of these is the Trinity River, which, rising in Scott and Trinity Mountains, receives numerous tributaries, and, flowing northwest, connects with the Klamath, emptying into the Pacific Ocean on the boundary line of Del Norte and Humboldt Counties. Mad River also has its rise in Trinity County, flowing northwesterly through Humboldt to the ocean. Eel River has its source in the Coast Range, in Mendocino County, and follows the general direction of the streams in this portion of the State, having a trend to the northwest. It has two main forks, the North and the South, and receives numerous smaller streams in its course. It empties into the Pacific near Table Bluff, in Humboldt County. Russian River rises in Mendocino County, flows south to about the middle of Sonoma County, and thence west to the ocean. These are the principal streams of the Coast Range north of San Francisco. The Klamath River, which has its rise in a group of lakes in Oregon, runs nearly its whole course in California, passing Siskiyou, Del Norte, and Humboldt Counties. It drains a very large watershed and is one of the most considerable streams of the State.

The Salinas River heads in the Coast Range, in San Luis Obispo County, and flows in a northwesterly direction through the Salinas

Valley, finding its outlet in Monterey Bay. It receives a number of minor tributary streams on its course, and is the principal river draining the southern Coast Range. The Salinas flows mostly on the west side of the valley, a region of mesa lands lying between it and the Santa Lucia Mountains still to the westward. The next stream of importance draining the Coast Range to the west is the Santa Maria, which forms the boundary between San Luis Obispo, and flowing from east to west, reaches the ocean at Guadaloupe. Rising in the eastern part of Santa Barbara, the Santa Maria flows its full length through that county to the ocean. Ventura County is drained by the Santa Clara River, which heads in the Coast Range in Los Angeles County, and flows west through Ventura, reaching the Pacific near San Buenaventura.

These streams form the chief system of drainage of the Coast Range south of the Golden Gate. They form a group by themselves. Many minor watercourses connect with them, and many other small streams exist here that flow a short distance and are lost. None of these rivers have any commercial importance, and many of them are reduced to insignificant dimensions in the summer months. For irrigation, however, they are of great importance, and by judiciously husbanding their waters, they can be made to irrigate a vast extent of the lower coast country.

The Sierra Nevada and the Coast Range unite in Kern County, and form the southern end of the San Joaquin Valley. South of this lies the region known as Southern California, and through this the Coast Range continues as a number of broken ranges, without any uniform trend, and having local names. In these a number of streams have their rise. These are usually torrents in winter and dry beds in summer. They are, however, of incalculable value to the country through which they pass, and supply ample water for irrigating purposes. A peculiarity of most of the streams of this portion of the State is, that, except in flood seasons, where left to follow their own course, they become lost in their own beds, which are composed largely of coarse sand, through which the water permeates to the bedrock.

Prominent among the streams of Southern California are the Los Angeles and San Gabriel Rivers, which have their source in the San Gabriel Mountains; the Santa Ana River, which heads in Mount San Bernardino, and the San Diego River. Besides these there are a number of smaller streams, the Santa Margarita, San Luis Rey, Tia Juana, and others. None of these are of any great length or importance, and their chief natural use is the drainage of the winter rainfall of the southern coast mountains. On the east side of the San Bernardino Range, the Mohave River and its tributaries have their rise. This, after flowing a few miles, sinks in the Mohave Desert on the eastern slope of the Sierra. Owens River, heading in Mono County, finds its outlet in Owens Lake, where it is lost.

Besides the great valleys of California, the Sacramento and the San Joaquin, there are almost innumerable valleys of minor size, in both the Coast and Sierra Nevada ranges. These are usually well watered and very fertile and are found at varying altitudes, from ocean-level to 8,000 or 10,000 feet elevation, and varying in area from a few acres to many miles in extent. In Siskiyou County, Scott Valley, 40 miles long and 7 miles wide, lies at an elevation of 3,000 feet. Shasta Valley, in the same county, is a barren lava plain, with some fertile spots. In

Modoc, on the eastern slope of the Sierra, lies Surprise Valley, containing 400 square miles. In this valley are three lakes, whose lengths are, respectively, 16, 20, and 15 miles, with widths of 3 to 5 miles. These lakes have no outlet, and sometimes are dry by evaporation. The length of this valley is about 60 miles, with a width of 15 miles. The valley of Goose Lake is mostly on the eastern side of the lake—which is 30 miles long and 15 miles wide—and reaches back 4 to 5 miles. Big, or Round Valley, on Pitt River, in the southwestern part of the county, reaching into Lassen County, is 30 miles long and 18 miles wide, and is mostly covered with sagebrush.

In Lassen County, Long Valley reaches southeastward to within 15 miles of Reno, and is narrow, except near Honey Lake. It is 40 miles in length, with an average width of but 2 to 3 miles. Honey Lake Valley is about 60 miles long from east to west, and from 15 to 20 miles in width. Between Big and Honey Lake Valleys are Grasshopper, Willow Creek, Eagle Lake, and Hare Lake Valleys, separated from each other and the main valleys by intervening ridges of various heights. In the northeastern portion of Lassen County, at an elevation of 5,315 feet, lies an extensive valley known as the Madeline Plain, extending about 25 miles from north to south, and having a length of nearly 50 miles.

From Plumas County a series of valleys stretch from northwest to southeast for a distance of 100 miles, running into Sierra County. These are Big Meadows, covering 30,000 acres of land, Mountain Meadows, Butte Valley, Indian Valley, Genesee Valley, Clover Valley, and Sierra Valley, the latter being 20 miles long and 10 miles broad, running into Sierra County, and one of the largest of the mountain valleys.

On the eastern slope of the southern Sierra Nevada are numerous valleys, but these partake largely of the desert character of the surrounding country, although some fertile spots are found. Owens Valley is the most important of these. It is a narrow basin between extremely lofty mountains. It has a length north and south of 140 miles, with an average width of 10 miles.

In Mono County are two important valleys, Big Meadows and Antelope, each about 10 miles long, and very narrow.

On the western slope of the Sierra is found the famous Yosemite Valley, in Mariposa County. This valley is about 8 miles long and its average width about 1 mile, its greatest breadth being 3 miles. It has an altitude of 4,060 feet above sea-level, and is of little interest from a horticultural standpoint. Ione and Jackson Valleys, in Amador County, are each 12 to 15 miles long, and from 2 to 5 miles in width. In both of these excellent fruit land is found. In Tuolumne County there are many lakes at the head of the tributaries of the Tuolumne River. The largest of these is Lake Elnor, situated in a valley 4 miles long and 1½ miles wide. In Kern we find Cummings Valley, with a length of 6 and a width of 3 miles; Bear Valley, 3 miles long and 1 mile wide; the valley of the South Fork of Kern River, 8 miles north of Havilah, containing about 40 square miles, and heavily timbered. Besides these, the foothills and higher mountains inclose numerous small valleys, many of which furnish the most favorable conditions in soil, climate, altitude, and water for fruit culture, and in many of these valleys is found the choicest fruit land of the State.

The Coast Range is more broken in its contour than the Sierra Nevada, and more valleys are found in them. These, however, are usually smaller than those of the Sierra. In Del Norte there are small valleys along the streams, the chief of which is Smith River Valley, with 18,000 acres. Among the mountains of Humboldt County there are small valleys watered by various streams, but the largest tract of level land lies around Humboldt Bay. The valley of Mattole is 12 miles long and 4 to 8 miles wide. The other valleys here are known by the names of the streams that flow through them, as Trinity, Eel, Mad River Valley, etc. Trinity County has also numerous small valleys, Hay Fork being the principal.

In Mendocino County several extensive and fertile valleys are found. Here is the main Russian River Valley, which extends 15 miles into Sonoma County; adjoining it on the north is Coyote Valley, 3 miles long and 1½ miles in width; Potter Valley, 6 miles long and 2 miles wide. North of Ukiah is Little Lake Valley; Sherwood Valley, 5 miles long and 1 mile wide, with an altitude of 2,500 feet; and Long Valley, all containing large areas of valuable land. Round Valley lies in the northern part of the county, and extends into Humboldt County. Lake County is included between the summits of two branches of the Coast Range, which unite at Mount St. Johns, on the north, and have an altitude of 3,000 to 4,000 feet. The valley thus formed has a length of about 40 miles and a width of 15 miles. Clear Lake is a central feature of the valley, and covers an area of one third of the valley. Its altitude is over 1,000 feet above sea-level. There are other valleys of minor importance: The Loconoma, Coyote, Cobb, Long, and others, in which more or less good agricultural land is found.

Passing through Sonoma County, and continuous with the southeast course of Russian River, is a series of valleys, reaching to the bay, and varying in width from 6 miles in Santa Rosa Valley to 3 miles in Petaluma Valley. These are bordered by a range of low mountains on the west and a higher range on the east. Sonoma Valley leaves this central valley near Santa Rosa, and reaches southeastward to the bay, with a width of about 2 miles, widening to 6 miles near the bay. Santa Rosa Valley is about 10 miles long and 6 miles wide. Bennet Valley, 8 miles long and 3 miles wide, unites with it near the town of Santa Rosa. Petaluma Valley is 12 miles long and 3 miles wide.

In Napa County, Napa Valley has a length of 35 miles from the bay inland, with an average width of 4 to 5 miles, except in the northern part, above Yountville, where it narrows to about 1 mile. Knights Valley, in the north, forms a connection between Napa and Russian River Valleys in Sonoma County; it is about 7 miles long and 2 miles wide. East of Napa Valley is Conn Valley, half a mile wide by 6 miles long; Wooden Valley, 3 miles long by 1 mile wide; Pope Valley, 8 miles long and 1 mile wide; Capelle Valley, 2 miles long and half a mile wide; Berryessa Valley, 7 miles long by 1½ miles wide. Besides these are Chiles Valley, Gordon Valley, Foss Valley, and Browns Valley.

In Solano County, Vaca Valley is one of the prominent fruit sections of the State, and with Pleasant Valley covers an area of 12 miles in length by 1 to 3 miles in width. Vaca Valley has a slope to the south and southeast, and Pleasant Valley has a slope to the northward, and both open out into the Sacramento Valley. Green Valley lies north of Benicia, and is about 11 miles long and 5 miles wide. Fairview Valley and Capay Valley are located in Yolo County.

Marin County embraces high hills and small valleys. There is but little level land in the county, and the valleys along the streams are generally narrow.

The surface of Contra Costa County is largely mountainous, and contains many valleys. Of these the principal is San Ramon, which reaches from Suisun Bay southward across the county, under different names, into Alameda County, where it connects with Livermore Valley. Between the bay and the foothills of Mount Diablo it has for a distance of 15 miles a width of about 6 miles, when it narrows down to 1 or 2 miles. A number of large valleys connect with this on either side, while numerous smaller valleys are found in the mountains here.

Continuing south we find the Alameda, Livermore, Sunol, Amador, San José, Vallecitos, and other smaller valleys, all containing good agricultural land and largely devoted to fruit culture. Livermore Valley is 14 miles long and has a varying width of 5 to 8 miles. Amador Valley is about 8 miles in diameter.

The Santa Clara Valley, with its surrounding foothills, comprises the most important horticultural district within the limits of the Coast Range. This valley has a length of about 70 miles, extending through Santa Clara into San Benito County. Eleven miles south of San José it suddenly contracts to about 100 yards, but opens out again to a width of several miles, continuing to the Pajaro River, where it connects with the Pajaro Valley, which unites it with the Salinas Valley, in Monterey County. From the Pajaro southward for several miles beyond Hollister, its width is about 12 miles, and the valley terminates or rises to a rolling plateau or bench land. Farther south the valley becomes more narrow and elevated, and is rarely over half a mile in width. At its northern extremity on the San Francisco Bay, Santa Clara Valley has a width of 20 miles, and its area in Santa Clara County is 405 square miles. Tributary to the main valley are a number of smaller valleys, following the watercourses, but none of these are of importance.

The Pajaro Valley lies in Santa Cruz and Monterey Counties, and is from 6 to 8 miles wide and 10 miles long, the greater part lying in Monterey County. San Lorenzo Valley lies wholly in Santa Cruz County, and is about 20 miles long and of varying width. Monterey is a county of valley and mountain, but the chief valley is the Salinas, which is over 90 miles in length and from 3 to 15 miles in width. It is drained by the Salinas River, which, like the greater part of the southern coast streams, runs dry during the summer months. Carmel Valley lies parallel to the Salinas Valley and west of it. Besides these there are Long Valley, 10 miles long by half a mile wide; Peach Tree Valley, 22 miles long and three fourths of a mile wide; Indian Valley, Priest Valley, and others of minor size. Besides the Santa Clara, which extends into San Benito County, there are in this county Hollister Valley; Bitter Water Valley, a continuation of Peach Tree Valley of Monterey County, 17 miles long and three fourths of a mile in width; Dry Lake Valley, 4 miles long, and the Santa Ana Valley, with an area of about 15 square miles. The Salinas Valley continues into San Luis Obispo County, and is there about 29 miles wide, and has an elevation of about 300 feet above sea-level.

The coast valleys on the west of the Santa Lucia Mountains are narrow on the north, but toward the south widen out to many miles, and are rolling and interspersed with many high ridges and hills. The Osos, Laguna, and Chorro run parallel with each other as far south as the mission lands around San Luis Obispo, thence the Corral de Piedra Valley continues south until it intersects the valley of the Arroyo Grande; beyond this is the Nipomo, and that portion of the Santa Maria Valley situated on the right bank of the Santa Maria, or Guyama River, which forms the southern boundary of the county where the Santa Maria Valley opens into Santa Barbara County. This valley, which lies partly in San Luis Obispo, but principally in Santa Barbara County, is 30 miles long and 10 miles wide. The Santa Inez Valley, in the latter county, is 30 miles long, with an average width of 2 miles. The Santa Inez range lies on the south, and separates the valley from the coast valley, in which the county seat is situated. The coast valley extends from Gaviota Pass to the Ventura County line, varying in width from 2 to 6 miles, and is divided into an upper and lower valley, the former known as Santa Barbara Valley. Carpenteria Valley lies east of Santa Barbara, and is a coast valley opening south and surrounded by high mountains. On the coast north of Point Concepcion lies Lompoc Valley, with a length of 37 miles, and an area of 35,000 acres of arable land. Between Lompoc and Santa Maria Valleys is the Los Alamos, with a length of 40 miles and a width of 2 miles at its widest point.

Ventura is another hilly and mountainous county, with numerous valleys of varying size, prominent among which are the valleys of the Santa Clara and Buenaventura Rivers. The former river, which is the longer, is bordered throughout its length by a valley which, from near Newhall, in Los Angeles County, varies in width from a mile or less as far as Santa Paula, then widens gradually, until within about 12 miles of the coast it suddenly expands until it reaches a width of 16 miles. The Buenaventura is narrow, averaging but one fourth of a mile in width, and is about 30 miles long. The Ojai Valley lies along the Cañada Larga, with an elevation of 800 to 1,000 feet, and is renowned for its fertility.

South of the junction of the Sierra Nevada with the Coast Range, the valleys are very numerous, and here are some of the most important in the State. The territory included in this division embraces the counties of Los Angeles, San Bernardino, San Diego, and Orange. The region subdivides naturally into a division embracing the Los Angeles and San Bernardino Plains, the chief agricultural portion of Southern California, and a division embracing the rolling hills, mesas, and interspersed valleys of San Diego. Both divisions are bordered eastward by the high and rugged mountains of the Sierra Madre, San Bernardino, and San Jacinto ranges.

The prominent feature of the southern region is the San Bernardino range of mountains, which, rising suddenly to an elevation of from 4,000 to 6,000 feet above the sea, separates the coast belt from the great desert. From its junction with the Sierra Nevada Mountains, in Kern County, it trends southeastward, and presently divides into two prongs, the northerly one continuing nearly to the Colorado River and gradually falling in elevation; the other, the San Jacinto range, bending southward, and, with a diminished height, passing out of the State into Mexico. This high range is almost altogether treeless and uninhabitable, has a width varying from a few miles to as much as 30 or 40 miles, and forms an almost unbroken barrier, with but few passes, between the great desert on the east and the agricultural valleys of the coast region.

To the westward of the range the mountains decline in altitude toward the coast, and are interspersed with many small valleys and mesa lands, and are penetrated to a distance of 75 miles eastward from the coast by the broad agricultural region known as the Los Angeles and San Bernardino Plains. The higher mountains, those that lie near the San Bernardino range, are partly timbered with oak, cedar, pine, and fir, while the lower ranges are mostly bare, their lower slopes and cañons being covered with chaparral. This division is watered by numerous streams flowing westward into the ocean, mostly without any great length. Of these the San Gabriel and Santa Ana Rivers, in the Los Angeles Plains, and the San Jacinto and San Diego Rivers, in San Diego County, are the largest.

The large agricultural region reaching inland from the coast, and bounded on the north by the high Sierra Madre, or San Bernardino mountain range, on the west by the Sierra, Santa Monica, and others, and on the east (apart from the San Bernardino Valley) by the Santa Ana Mountains, covers an area of nearly 2,000 square miles. Its extent along the coast is about 65 miles, though broken by some mesa lands and hills. Northward it reaches about 35 miles across a chain of low hills to the mountains, whence it extends eastward for 40 miles in a belt of from 5 to 20 miles in width, forming the San Bernardino Valley, and westward into the San Fernando Valley, its entire length east and west being about 90 miles. It is divided properly into several large valley regions: the San Fernando Valley on the northwest, separated from the coast and Los Angeles Plain by the Santa Monica Mountains; the Los Angeles Plain proper, reaching along the coast from the latter mountains southeastward and inland to the high ranges, and including the San Gabriel Valley; and the San Bernardino Valley, forming the eastern extension alluded to, and separated from the coast on the south by the Santa Ana range of mountains.

San Fernando Valley is about 16 miles long and 12 miles wide, narrowing to a gap on the east, where it enters the Los Angeles Plain. It has an area of about 200 square miles. Antelope Valley lies in the northeastern portion of Los Angeles County, and opens out toward the Mohave Desert. The Los Angeles Valley reaches from Santa Monica Mountains southeast along the coast to the San Diego County line, and the San Gabriel Valley, separated from the Los Angeles Valley and the coast by the Santa Ana range, continues into San Bernardino County. The two latter valleys form the Los Angeles Plain.

East from the Los Angeles Valley, and connected with it by low passes, lies the San Bernardino Valley, with an elevation of 1,000 feet. This is surrounded on the north and east by a high chain of mountains ranging from 6,000 to 11,000 feet in height. The San Mateo Valley is separated from it by a range of low mountains, and extends from San Gorgonio to near Redlands. In the high mountains of San Bernardino are numerous smaller valleys—as Bear and Holcomb Valleys—but the altitude of these (5,000 to 6,000 feet) renders them unfit for horticultural purposes. Extending from San Bernardino into San Diego County are the San Jacinto Plains, an extensive area, bounded on the northeast by the San Jacinto range, and having numerous buttes interspersed among its level lands. It is drained by the San Jacinto River, which has an outlet in Lake Elsinore, but runs dry in the summer months.

San Diego County is covered with rolling hills and mountains, and possesses numerous small valleys, but none of great extent. The principal of these is the Cajon, located about 15 miles from San Diego. This valley is 6 miles long and 4 miles wide, and has proven remarkably prolific in fine fruits. Through the hills and mountains are a number of small valleys under cultivation. Among these are the San Luis Rey, Santa Margarita, Las Flores, Valle de las Viejas, Cuyamaca, Santa Ysabel, Mesa Grande, Warners Ranch, Guijito, Bear, Pauma, Smiths Mountain, and a number of smaller valleys.

East of the mountains, bordering the fertile section of the southern portion of the State, lies the vast section known as the desert region, and divided into the Mohave and Colorado Deserts. This reaches from the State line on the south, following the course of the Colorado River, extending to and over the greater part of the length of Inyo County, and covering portions of San Diego, San Bernardino, Los Angeles, Kern, and Inyo Counties; eastward it reaches far into Arizona. On the west it abuts against the foot of the high Sierra, and on the south against that of the San Bernardino range of mountains, both rising thousands of feet above it. The larger part of its surface, as a plateau skirting the foot of the mountains, lies at an elevation of 2,000 feet above the sea, and is comparatively level, though broken frequently by isolated short ranges and peaks rising a thousand feet or less above it. In its center there is a large area which is not more than 1,000 feet above the sea, and in Inyo County a still smaller region, known as Death Valley, sinks to some hundreds of feet below sea-level.

Coahuila Valley, or that portion of the desert included between the two prongs of the mountain range on the south, is mostly below 1,000 feet in elevation, a large portion sinking below the level of the sea, Dry Lake, near Dos Palmas Station on the Southern Pacific Railroad, being said to be some 500 feet below this level. There are scarcely any streams through the desert, except along its border, where they flow from the adjoining mountains and soon disappear in the sands. Mohave River, which gives its name to the northern desert region, is the largest stream, but after flowing from the San Bernardino Mountains for a short distance out into the desert, it suddenly disappears. The desert is a sandy, barren waste, interspersed with salt lakes and alkali tracts, destitute of all timber growth, except occasional tracts of yucca, small nut pines, and juniper. It is, especially on the south, subject to very frequent and severe sand storms, which not only cover the lands of the region with deep and shifting deposits, but often blow through the passes, and, with their lighter sands, greatly annoy the people of the agricultural valleys on the west side of the mountains.

CHAPTER III.

CLIMATIC.

The climate of California, until one has carefully studied most of the conditions, is a recurrence of perpetual surprises. In general terms, we have the wet and the dry season; but aside from this statement, no wide-reaching, general condition can be named. As has been already stated, latitude cuts very little figure, in fact its influence seems, in many cases, to be reversed. The influence of altitude, contour, contiguous bodies of water, exposure, mountain ranges, and ocean breezes is so great that until these are understood one can hardly form a judgment as to the climate of any given locality.

The term climate should be made to cover three conditions, namely: temperature, humidity, and salubrity. These are all in a more or less degree mutually interdependent, but each has its part to play in the final result.

The ocean climate extends, as does the Coast Range of mountains, the length of the State. The prevailing winds, even unmodified by the daily sea breeze, are from the west. They follow or cover the Japan Current, and are in a measure tempered by it, being much warmer than the general ocean breeze; and these, with the warmer waters that impinge upon the western shore, give to us a warmer climate in winter, and, because of the equalizing effect of the ocean, cooler in summer than places of corresponding latitude on the Atlantic Coast. In Oregon and Northern California these winds are moist, giving great humidity, the rainfall there being very abundant. The several spurs of the Coast Range strip this moisture from the air as it trends down the coast, until in the southern part, south of Monterey, it becomes a dry wind, giving but little rain or fog, except when met by the cooler current from the south, or by a cold breeze from the snow-clad summits of the Sierra; the latter having, perhaps, the greater influence. These come during the rainy season, in apparent south winds, and the amount of rainfall in any given year is gauged and fairly well foretold by the amount of snow on the Sierra ranges.

From this it follows that the coast climate is very equable, comparatively warm, without great regard to either latitude or altitude, moist in the north and usually dry in the southern part. That it is salubrious becomes obvious, for, as there are no considerable marshes, except salt-water tule ground, there is, except in a few localities, an entire absence of malaria. Thus, there are present all the conditions for an exceedingly healthful climate.

It is notable that the isotherm (the line of average temperature) that passes through New York City runs far north of the north line of Oregon, while the line passing through Florida runs nearly as far north as San Francisco.

The climate of the great inland valley, called the Sacramento on the north and the San Joaquin at the south end, is governed by other conditions. Nearly cut off on all sides from cold winds by the Sierra on the east, and more especially by the joining of the Sierra and the Coast Range on the north, by which it is entirely protected from the Arctic winds, and lying as fully exposed valleys, open to the rays of the warm summer sun, we have here, even to the very north end of the valley, a warm, and in the southern part of San Joaquin a hot, climate. There is this anomaly: In many of the small northern valleys between the mountain spurs on either side, the average summer temperature is higher than in the part of the State 400 miles farther south. Longitude makes, for reasons given, all through California, a greater difference in temperature than does latitude. To understand this, reference must be had to the breaking down of the Coast Range of mountains, which in summer allows the cooler ocean winds to pass toward the interior. The effect of this is shown in a marked degree in the climate of Solano, Napa, Sonoma, Contra Costa, and Alameda Counties, as also in Los Angeles and San Diego Counties on the south. Here again the isotherm passes far north—much farther than on the coast. The temperature in these valleys in winter is determined, however, by latitude and by altitude. The winters are therefore much colder than in the more southern parts of the State. Except upon the summits of the ranges, that is, an elevation of about 4,000 feet, snow rarely falls, and when it does, lies but a few hours at a time, or at most but a day or two. Both in the Coast Range and in the interior valleys lightning and thunder are exceedingly rare phenomena.

The climate in these valleys, except where much changed by these ocean winds through the break, is dry. The winds entering San Francisco Bay are, by the formation of the bay and surroundings, deflected toward the north, giving to some of the counties abundant rainfall. These winds come as apparently south winds, although they originated in the north, and come into the State originally as northwest winds. In the more southerly counties the rainfall grows less, while towards the extreme north, as in parts of Shasta County, it is very great.

The inland valleys are all healthful, except along low river bottoms, where there is some malaria. This, unless prolonged by excessive surface irrigation, will soon pass away, as it has on the prairies in the valley of the Mississippi under the influence of the cultivation of the soil.

At times in the San Joaquin Valley and lands adjacent, a wind prevails, denominated the "hot norther." This is, in the early spring, quite destructive. The cause of this has not been fully and satisfactorily explained, and partly for this reason it is much dreaded by the farmer.

In the Sierra the climatic changes are more easily understood, being largely influenced by altitude. Above pretty well-defined elevations the percipitation is all, or nearly all, in the form of snow. The moisture not already deposited upon the Coast Range is here condensed, and from early fall until late in summer the summits of the mountains are covered with snow. On not a few of them it lies the year round. This condensation, where the wind coming to the summits comes from the right direction, is immense—the entire snowfall being in some places, as at Summit Station, equivalent to 60 feet of fresh snow. Hence, the necessity for the many miles of snowsheds over the railroad on the Sierra, and for their ponderous strength. There is probably no time when in four or five hours' travel from Sacramento one could not reach banks of perpetual snow.

The melting of snow in summer fills the mountain streams with water, and these, running westward from this range, and those running eastward from the Coast Range, pouring into the Sacramento and San Joaquin Rivers, make the summer floods, which so greatly surprise Eastern visitors. These snow-fed mountain streams are the great supply for mining industries, and they will eventually be of immense value for irrigation. In general, the Sierra country is, in summer, dry, relieved somewhat by the ocean winds that come in and finally reach it through the openings in the Coast Range.

It will, of course, be understood that the uplands of this range have a very low temperature in winter, and in some places during the spring and fall, and even in midsummer, thunder storms are of frequent occurrence.

In all this region the climate is entirely healthful. The dryness of the air, its extreme rarity in the upper region, the fact that it is charged with the balsamic odors of the pines and firs, the entire absence of any other foreign matter in it, make it indeed a life-giving elixir to all who are suffering from pulmonary difficulties.

This dryness of the atmosphere, which is prevalent throughout the State, except in the little valleys and on the low foothills on the west side of the Coast Range, is a climatic feature of California, which, as will be shown hereafter, is peculiarly advantageous to it as a fruit-growing State. During all the summer there are no sultry days. A temperature of 100° or 110° is here less oppressive than a temperature of 85° or 90° on the east side of the continent. Sunstrokes are here practically unknown. The same is true of rabies among dogs. The exceedingly dry atmosphere takes up the perspiration so rapidly that the system is kept, even at the highest temperature named, if one is only well protected from the direct rays of the sun, cool enough for comfort.

There is one other fact that is peculiar here, and that exercises a wonderful beneficial influence upon our agricultural and horticultural industries. This, together with the causes of the annual precipitation at diverse points in the State, and the probability of rainy, clear, and cloudy days, is ably set forth in the following paper by Lieut. John P. Finley, of the Weather Bureau, which is here given by consent of the author:

"The weather of any place is the sum of its transient meteorological phenomena. To find the sum of such occurrences in California will require more than ordinary calculation. In other words, there is variety in her weather, as there is diversity in her industries. To understand these varying conditions one must consider, at least, the following important general features: (1) The great extent of latitude embraced by the State; (2) its pronounced topographic outlines; (3) its position relative to the North Pacific Cyclone Belt; (4) its relation to the Japan and Alaskan Currents of the North Pacific. To comprehend the meteorology of such a region one must become impressed with the necessity of extending the investigation far beyond the limits of the State. Surrounding atmospheric conditions for hundreds of miles must be closely watched to discover the source of those phases of cloud and sky which make the progress of peculiar systems of circulating air, under the influence of the axial rotation of the earth, which brings over large areas of country changes in temperature and degrees of percipitation, affecting the prosperity of thousands of square miles of territory. You cannot study weather understandingly from your own doorstep.

"Because of California's great extent of territory north and south, she feels the effect of tropical influences as well as those of the temperate zone. Coupled with her varied topography, unequaled in the United States, the fluctuations of atmospheric pressure within the extreme limits of the North Pacific Cyclone Belt give rise to some anomalies in weather both extremely interesting and complicated. Why wonder at the results, with a surface contour affording extraordinary differences in elevation, from nearly 300 feet below to about 15,000 feet above sea-level, permitting variations in temperatures from torrid heat to Arctic cold, and changes in atmospheric humidity from the driest areas on the continent to the saturation of a tropical clime? The most skilled meteorologist will find ample scope for the exercise of his knowledge and professional training.

"Being at one season largely within, and at another largely without, the predominating influence of cyclonic disturbances, introduces peculiarities of weather and climate which distinguishes the meteorology of California from any other portion of the United States.

"The proximity of the two ocean currents, essentially different as to temperature, course of movement, and atmospheric effect, gives rise to a coast climate remarkably at variance with that of the interior valleys, only a few miles away, and still different from the adjacent mountain districts. No State in the Union is so uniquely situated, so diversified as to climate and weather, within such circumscribed limits.

"All the various local and secondary causes are largely subservient to one superior and overwhelming influence—the action of the North Pacific Cyclone Belt.

"The meteorology of the State as a whole, as well as of its individual portions, falls under the sway of this power. The notion must be discarded that the weather of California is not dependent upon atmospheric conditions over adjacent regions to great distances, especially over States to the east and north. This dependence arises from the fact that these adjacent States are nearer, and therefore more strongly affected by the passage of cyclonic disturbances. All of these disturbances enter upon the coast from the North Pacific Ocean. They are huge atmospheric eddies, which have developed in the air, resting upon the warm waters of the Japan Current. The typhoon of the China and Japan Seas becomes, later on in its course, the cyclonic disturbances which sweep across British Columbia, thence to the region of the Great Lakes, and farther on to the Atlantic and Europe.

"All cyclones cross the United States at a lower latitude in winter than in summer. This condition results, in part, from the apparent movement of the sun north and south of the equator, whereby the area of heat and moisture of the temperate zone reaches a higher latitude in summer and recedes to a lower latitude in winter. The atmospheric eddies enter the continent at about the 50th parallel, being about the latitude of the center of the northern portion of the Japan Current, which flows eastward from the Asiatic coast. The fluctuation north and south of the Cyclone Belt of the Pacific Coast depends, then, upon the change in the location of the areas of heat and moisture. These two elements constitute the food of cyclonic disturbances, and without an almost unlimited source of supply areas of low barometric pressure begin to fill up and disappear. Clouds and rain, with boisterous winds, are soon followed by clear, calm weather and a dry, cool atmosphere.

"To understand the distribution of precipitation over any region, one must clearly comprehend the essential characteristics of a cyclonic disturbance. Such information is especially necessary regarding the rainfall of California, for its occurrence and distribution are peculiar and unlike, in some respects, that of any other State.

"As cyclonic disturbances may vary in diameter from 500 to 1,500 miles, and the centers invariably move eastward north of San Francisco, it would rarely, if ever, occur that the whole of any area could be shown on a chart of the Pacific Slope. From the Pacific to the Mississippi Valley the direction is a little south of east. From that river to the Atlantic the course is somewhat north of east. The forms of cyclonic areas are either elliptical or circular, and the former predominate on the Pacific Coast. The isobaric line of 30,000 inches marks the separation between the two principal classes of atmospheric disturbances, viz.: the cyclone (low) and the anti-cyclone (high).

"An observant 'new arrival' is not long in discovering that California has, during the year, two weather periods, instead of four, known as the 'wet season' and the 'dry season.' He learns that they are powerful factors in ascertaining the prosperity of the commonwealth. When nature, in a kind mood, arranges the relation of these two seasons with a marked uniformity of variations, then Dame Fortune smiles upon the commercial and agricultural interests of the State. If the exact character of these seasons could be forecast in advance, what an enormous profit could be realized! Such long-range prognostications have never been vouchsafed to man, and there is no immediate prospect of his acquiring such extraordinary knowledge.

"We must be content for the present, at least, with a much more limited degree of information, and yet not lacking in practical importance.

"The two meteorological seasons of California are dependent for their proximate occurrence upon the distribution and frequency of cyclonic disturbances between the 40th and 50th parallels, and the rate of progress eastward, together with the energy displayed between the Pacific Coast and the 100th meridian. In short, the cyclones move farther south, and are of greater energy in winter (the 'wet season') than in summer (the 'dry season'). A careful examination of the charts in the office of the Weather Bureau will show very clearly that the weather over any region depends upon the relation of the latter to the quadrants of the passing cyclonic or anti-cyclonic disturbance. According as one or another of the quadrants covers any region, so will be the successive phases of weather therein.

"All forms of atmospheric precipitation are distributed over the earth through the agency of these systems of air circulation. They are of enormous extent and great power, drawing moisture from all available sources, carrying it to great heights in the atmosphere, where, by a marked change in its surroundings, the vapor is transformed into water, and falls again upon the earth. The physical forces of evaporation and condensation cannot fulfill their mission in the production of atmospheric precipitation without the assistance of adequate means for setting up and maintaining a system of circulation for the distribution of the vapor of water throughout the lower regions of the atmosphere.

"It has been found that these atmospheric eddies pursue certain paths over the continent of North America. There are two such lines of travel, one along the northern boundary of the United States, and the other from the West Indies northwestward to the Gulf States, curving at the 30th parallel, north latitude, and moving thence northeastward over the Atlantic Coast States. The second path joins with the first one near Nova Scotia, where, together, they form a well-beaten path, along the 45th parallel, of all cyclonic disturbances crossing to Europe.

"It is a fact to which attention has not been drawn, that that portion of the United States most distant from the influences of the atmospheric eddies which travel the two storm paths embraces what is known as the middle and southern plateau regions. They include southeastern California, Nevada, Utah, Arizona, New Mexico, western Colorado, and southern Wyoming. This may be called the dry region of the United

States. It is well known as the region of least rainfall, and has been found to be the region over which the greatest atmospheric evaporation (about 100 inches annually) takes place. There can be no doubt but the meteorology and the climatology of this region depend most largely upon its geographical position regarding the cyclonic belts over the United States. California's share in this relationship cannot be understood without a comprehensive and graphic view of the whole situation.

"The reader must already begin to see some evidence of the preponderating influence in the distribution of precipitation over the United States, and especially the Pacific Slope. Of course all general and predominating influences are counteracted here and there by local differences, which, in this discussion, may be briefly referred to as topographical. The limits of this paper will not permit of considering this branch of the subject particularly. The tabulated data given herein will illustrate some of the effects of local surroundings. The dry region of the United States can never be other than it is, so far as atmospheric conditions are concerned, without a great physical change, which would completely reverse the circulation of the Japan Current in the North Pacific Ocean, and bring it nearer the California coast. It must needs bathe this coast, as does the Gulf Stream the coast of the South and Middle Atlantic States. Then would the dry region become, in weather and climate, and in vegetation, as that of the Gulf and South Atlantic States.

"We find that the weather of California, like that of any other region, is dependent upon the atmospheric conditions surrounding it for hundreds of miles. If it were nearer the Cyclone Belts, its two famous seasons, the 'wet' and the 'dry,' would be changed into a more uniform distribution of precipitation throughout the year, and a less uniform distribution of temperature. Such a modification of its climate would be detrimental to some of California's greatest industrial pursuits. Its variety of weather and climate is unrivaled in the United States, and therefore the peculiar adaptability of the State for the growth of the choicest fruits, grasses, and cereals. Its geographical position is such that the seasonable fluctuations of the North Pacific Cyclone Belt carries the rain area far to the north, and protects the crops that would otherwise suffer severely from heavy cloudiness and drenching rains.

"The precipitation of the 'wet season,' when the Cyclone Belt takes a more southerly course, is generally heavy; and there is stored in the earth a supply of moisture that frequently goes far toward supplying the needs of summer. When this source fails resort must be had to either surface or sub-irrigation. But the 'dry season' in California does not mean an entire absence of rain throughout the State. Rains occur on the northwest coast from San Francisco northward, and in the mountains in the northeast and southeast portions during the summer. They are frequently heavy, with thunder storms in the southeast portion. The central valleys are the driest in summer, especially in July and August, where, in some places, no rain falls during these months for a period of several years. In any case only the slightest showers would occur, at long intervals, resulting from the drifting over and settling down into the valleys of heavy clouds from the mountains. Such precipitation is likely to occur when the snows of the previous winter have been heavy and the mountains remain snow-capped throughout the year.

"The average rainfall values at selected stations in California are shown in Table No. 1. Records are given from both the regular weather stations and those where the observations were made by voluntary observers. By such selection a better idea can be given of the distribution of precipitation over the State.

"As average values do not give an idea of the extremes, I have added an extra column to show the greatest seasonal amount reported, with date of occurrence. An examination of this table will show what marked variations exist between summer and winter rainfall. It will also call attention to the fact that even the 'wet season,' with its southerly trend of the Cyclone Belt, fails to produce adequate precipitation for southeastern California. The values in this table will not show, satisfactorily, the average depth of snowfall in the mountain districts, a very important factor in forecasting the rains for July and August, and ascertaining the probable water supply for irrigating purposes. Some idea of the distribution of this form of precipitation can be obtained from the selected stations, Tehachapi, Summit, Colfax, and Susanville. Heavy snow in the mountains in winter, will probably result in heavy rains in the valleys in summer. The enormous extent of surface covered with snow, from a few inches to many feet in depth, offers an extraordinary opportunity for rapid evaporation under the burning rays of the morning sun through a clear, crisp atmosphere. Heavy clouds appear over the lofty ranges by about 12 noon, and when the sun begins his downward course, and the air currents are pushing down the mountains, great masses of clouds are hurled together and carried over the valleys, attended by smart showers and occasional manifestations of atmospheric electricity.

"Here we have a brief view of the conditions under which summer rains occur in the mountain districts of California, especially in the southeastern portion of the State, and the adjacent regions of Nevada and Arizona. Even these may be called cyclonic rains, for they invariably occur under the influence of a barometric trough of low pressure, covering the eastern portion of the Pacific States, the center of the cyclonic disturbance being in British Columbia, north of Montana. The effect of this trough may not disappear until the central area moves eastward into Dakota and Minnesota, like a monstrous sea serpent dragging his tail behind him.

"A low barometric pressure is especially favorable to evaporation and the development of ascensional air currents, which force great quantities of vapor into the air that is rapidly condensed into clouds. Clouds consist of small drops of water light enough to float in the air. Fogs are clouds resting upon or very near to the surface of the earth. When the drops of water become large enough and sufficiently heavy to fall to the earth they are called, collectively, rain. I have quickly depicted here the transitions from water into the liquid and solid state, through the vapor or gaseous form, to the liquid state again. What a powerful engine is the atmosphere, and how nicely adjusted must be all the cogs, wheels, springs, and compensations of this exquisite piece of machinery, that it never wears out nor breaks down, nor fails to do its work at the right time and in the right way.

"The effect of the fluctuation of the North Pacific Cyclone Belt is also shown in the probability of rainy days for various parts of the State (see Table No. 2), and in the percentage of clear and cloudy days as given in Tables Nos. 3 and 4. It will be noticed that the probability of rain for the valleys is proportionately much lower in summer than the probability of cloud formation. This is largely due to the fact that while the northward deflection of the Cyclone Belt is sufficient to prevent rain, it does not remove the influence of cyclonic circulation in the production of cloud formation. At times the sky will remain overcast for several days, and pass away without precipitation. The condensation has not been sufficiently vigorous under cyclonic circulation to develop drops of water of sufficient size to fall to the earth.

"These tables furnish interesting and valuable data for comparative climatic study, and show the importance of systematic meteorological investigation. Perhaps very few of my readers will be able to realize the vast amount of labor in computations, and the long years of constant watching secretly represented in this little collection of figures. It is a patient, but determined study of nature, who refuses to reveal herself without the most ingenious and prolonged effort of man.

"No portion of the United States offers richer opportunities for meteorological research, or will afford greater practical results from thorough and systematic investigation, than the weather and climate of California. No State is in greater need of such scientific inquiry; and if successfully prosecuted it will greatly aid in the development of her rich resources. It will bring them to the attention of thousands who would be glad to enjoy the fruits of 'perpetual summer;' the opportunities of a wonderfully varied climate and soil; the invigorating influence of unsurpassed mountain air and scenery; and the advantages of marked uniformity of temperature along a coast-line of marvelous extent and diversity.

"Theoretically, California should furnish the best and most varied health resorts and sanitariums in the United States. Within her borders most every form of wasting disease should find the means of temporary, if not permanent, relief.

"While our present knowledge warrants this assumption, yet practically the truth of this statement, in all necessary details, must be developed and tested by adequate scientific research.

"The agricultural, horticultural, and commercial interests must be more fully informed as to the probabilities before them, and every line of industry afforded the means of weighing thoroughly its chances for growth and success.

"A reliable knowledge of probable weather changes and of climatic effects is rapidly becoming a daily necessity in all occupations.

TABLE No. 1.

Monthly and Annual Average Rainfall, in Inches, at Weather Bureau Stations in California, from Records for Many Years.

Stations.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.	Maximum Seasonal Amount.
San Francisco	5.06	3.76	3.07	2.04	0.62	0.15	0.02	0.02	0.16	0.85	2.85	5.20	23.80	49.27—1861-62
Eureka	7.63	5.61	4.55	4.15	2.05	1.07	0.10	0.02	0.73	2.73	3.95	7.25	39.50	73.99—1889-90
Red Bluff	5.97	3.87	2.54	2.18	0.78	0.37	T.	0.05	0.41	1.22	2.84	3.76	23.99	61.65—1877-78
Sacramento	3.77	2.69	2.86	1.95	0.69	0.13	0.03	T.	0.11	0.68	2.06	4.52	19.69	36.36—1852-53
Fresno	1.30	1.21	1.21	1.64	0.30	0.13	0.00	0.00	0.12	0.39	1.21	1.28	8.79	16.62—1885-86
Keeler	0.25	0.54	0.24	0.64	0.41	0.22	0.17	0.10	0.27	0.27	0.18	0.38	3.67	5.76—1887-88
Bidwell	4.24	2.71	2.25	1.68	1.37	1.13	0.31	0.20	0.38	0.96	2.08	3.46	20.77	37.20—1866-67
Los Angeles	3.93	3.76	1.90	1.34	0.35	0.09	T.	0.08	0.01	0.35	1.49	2.73	16.03	32.16—1883-84
San Diego	1.55	2.22	1.38	0.90	0.44	0.07	0.01	0.19	0.03	0.29	1.02	2.16	10.26	25.97—1883-84
Yuma	0.37	0.48	0.20	0.11	0.04	T.	0.15	0.45	0.15	0.12	0.36	0.38	2.81	5.86—1884
Other Stations.														
Fort Gaston	10.56	7.99	7.50	4.70	1.74	0.75	0.12	0.11	0.89	2.67	7.69	10.70	55.42	125.36—1865-66
Crescent City	13.69	10.44	6.29	8.56	2.75	2.31	0.65	0.08	3.49	10.22	11.37	18.90	88.77	113.45—1881-82
Nevada City	10.93	7.68	8.57	5.14	2.06	0.60	0.04	0.03	0.54	1.82	6.77	12.09	56.27	115.26—1867-68
Mammoth Tank	0.19	0.43	0.09	0.11	0.02	0.00	0.06	0.13	0.03	0.14	0.16	0.49	1.85	3.11—1883-84
San Bernardino	3.66	3.03	1.97	1.75	0.44	0.06	0.02	0.08	0.05	0.43	1.58	3.10	16.17	37.51—1883-84
Campo	2.36	2.80	2.38	2.58	0.27	0.05	0.60	0.37	0.01	0.41	1.13	2.21	15.17	19.63—1882-83
San Luis Obispo	4.68	3.75	2.81	2.05	0.35	0.14	T.	T.	0.03	0.72	1.95	4.53	21.01	42.40—1883-84
Tehachapi	1.28	3.54	1.68	1.83	0.38	0.13	0.01	0.09	0.03	0.42	0.73	1.52	11.64	18.77—1883-84
Summit	8.39	8.96	6.78	5.77	1.68	0.62	0.08	0.01	0.19	2.34	2.82	7.32	44.96	87.99—1879-80
Colfax	8.36	6.77	6.28	4.97	1.63	0.52	0.00	0.00	0.32	1.74	5.06	7.67	43.33	89.80—1889-90
Susanville*	8.86	5.48	5.53	1.35	4.40	0.60	0.03	0.07	0.08	2.09	1.89	9.84	39.42	----------

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*Record for only two years.

TABLE No. 2.

Monthly Percentages of Probability of Rainy Days at Weather Bureau Stations in California, from Records for Many Years.

Stations.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
San Francisco	38	38	31	25	11	8	2	1	5	11	22	34
Eureka	50	43	37	34	21	17	3	2	11	29	35	46
Red Bluff	34	32	28	29	17	11	2	1	6	12	25	34
Sacramento	31	31	29	25	9	5	1	1	4	11	18	31
Fresno	22	25	19	22	8	3	1	1	3	8	15	20
Keeler	10	14	9	17	9	4	7	4	4	5	14	8
Bidwell	44	40	29	27	32	31	13	4	6	12	38	45
Los Angeles	18	23	24	21	9	5	1	1	1	7	11	17
San Diego	19	25	22	19	11	5	2	2	2	7	10	17
Yuma	5	7	4	3	1	1	3	9	3	2	4	7

TABLE No. 3.

Monthly Percentages of Probability of Clear (Sunshine) Days at Weather Bureau Stations in California, from Records for Many Years.

Stations.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
San Francisco	52	54	54	58	60	60	60	57	66	68	62	53
Eureka	47	59	52	44	55	61	72	83	76	60	55	50
Red Bluff	55	57	61	60	65	80	90	94	89	79	66	52
Sacramento	58	67	65	66	76	86	95	97	91	83	72	65
Fresno	57	55	62	60	76	89	96	98	94	84	76	53
Keeler	73	75	74	74	79	89	85	89	90	86	75	74
Bidwell	42	53	51	54	53	58	82	84	83	69	50	43
Los Angeles	68	63	58	53	57	61	71	75	77	74	74	69
San Diego	61	59	52	54	46	50	53	60	62	61	65	63
Yuma	76	78	78	84	88	92	83	78	90	88	81	80

TABLE No. 4.

Monthly Percentages of Probability of Cloudy Days at Weather Bureau Stations in California, from Records for Many Years.

Stations.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
San Francisco	48	46	46	42	40	40	40	43	34	32	38	47
Eureka	53	41	48	56	45	39	28	17	24	40	45	50
Red Bluff	45	43	39	40	35	20	10	6	11	21	34	48
Sacramento	42	33	35	34	24	14	5	3	9	17	28	35
Fresno	43	45	38	40	24	11	4	2	6	16	24	47
Keeler	27	25	26	26	21	11	15	11	10	14	25	26
Bidwell	58	47	49	46	47	42	18	16	17	31	50	57
Los Angeles	32	37	42	47	43	39	29	25	23	26	26	31
San Diego	39	41	48	46	54	50	47	40	38	39	35	37
Yuma	24	22	22	16	12	8	17	22	10	12	19	20

CHAPTER IV.

HORTICULTURAL HISTORY.

The horticultural history of California can be briefly written. The horticulture of the Missions comprises the first period. The first records of horticulture note that as early as 1701–07, Father Ugarte caused the desert to blossom as the rose by the culture of a piece of rich soil at St. Xavier in Lower California. In the latter year he was eating bread of his own raising, while New Spain was suffering from drought. He also is said to have made more wine from the vineyards he had planted than was wanted for Mission use, and to have exported small quantities to Mexico, an early beginning of the wine shipments from this coast.

California proper was not occupied by the whites until many years later. In 1767 the Jesuits were driven from the Missions in Lower California, and everything they had was turned over to the Franciscan monks. Junipero Serra was selected as the President of the Missions, and set out for his field of labor. The Dominicans clamoring for a share in the Mission work, a division was made, and in 1769 the Franciscans started northward, entering upon and occupying what is now the State of California. José de Galvez, Visitor-General, and secular head, representing the king, with Father Serra, proceeded to make arrangements for the establishment of new settlements. Galvez seems to have been far-seeing, for in the manifests of the vessels sent it is found that he had caused to be shipped to Alta California, flower, vegetable, and fruit seeds, for garden and orchard, and grain for the field. Twenty-one Missions were established, all but three of which had gardens and orchards.

Thus, in the very early days, we find introduced the olive, the fig, and the grape. The trees were grown chiefly from seed, and were probably all, or nearly all, seedlings. Of these, there are three that have been perpetuated, namely, the Mission olive, the Mission grape, and the black fig, now designated as the Mission fig. In 1792 there were growing near the Mission San José, apples, pears, apricots, peaches, and figs; and at San Buenaventura, in addition to these, oranges, limes, grapes, olives, and pomegranates. At this time there were in the several Missions about five thousand bearing trees. This was, of course, a very small number, but these trees play an important part in the horticultural advancement of the State. They showed the possibilities in fruit culture, and furnished seeds, stock, cions, and from the vineyards, grape cuttings, for many orchards and vineyards.

Fruit culture in early days in California was incidental. That it would ever become the chief industry of a great Commonwealth was not then dreamed possible. The Franciscan fathers when they brought a few seeds with them did so in order that they might have some of the fruits they had enjoyed in their native land for their own tables, not for the purpose of cultivating orchards for the benefit of others, or for producing fruit for sale. Their efforts were devoted to the building up of their Missions, increasing the number of their adherents, and enlarging the herds in which the wealth of their Missions lay. The hides and tallow of the numerous herds that in those early days ranged the almost sterile plains of California were the only source of wealth possessed by its sparse population.

After the occupation of the southern part of the State by the Franciscans the Russians penetrated from Russian America southward, and as early as 1812 planted an orchard of mixed fruits at Fort Ross, in Sonoma County. This was a trapping settlement at that period, and consisted of some twenty-four houses, and the fruits comprised apples, apricots, pears, cherries, and vines. The property passed afterwards into the hands of Captain Sutter. Some of the apple trees are still bearing fruit, but the other trees are dead.

The Russian orchards, like those of the Mission fathers, were not planted from a commercial consideration, but to supply their respective owners with fruit for home consumption.

Outside of the Missions there were a few attempts at horticulture. General Vallejo planted an orchard at Sonoma as early as 1830, and there was the apple orchard at Fort Ross already mentioned. General Bidwell speaks of it as bearing in 1842. He also says that at Mission San José there were about six acres in orchard and vineyard in 1841, besides others at Santa Clara, and what is now San José. Orchards and vineyards were planted in Los Angeles, and on Putah Creek, in Yolo County, as early as 1845. These were planted by the Wolfskills, and many of the trees are now standing and in bearing. This covers what might be called the "prehistoric" horticulture of the coast.

In 1849, when the gold fever broke out, no thought was given by the majority of those who came here to anything but gold mining. True, a few men, perhaps not quite so adventurous as the others, or not so impatient for immediate gain, got possession of some of the orchards, took reasonably good care of them, and afterwards found that, with fruit in demand at from 50 cents to $1 a pound, they, too, had a "mine."

Beginning at this period, there have been three distinct eras in the development of the State. The first was the gold-seeking era—the type of which was a buckskin sack, in which the dust was carried, and from which it was measured out in pinches at so much a pinch. This continued for many years. But the cost of sustenance was so great that thoughtful persons, observing the possibilities of soil and climate, cast about for a way of reducing this cost, by growing the necessaries of life here. Then the second era, the era of grain culture—its symbol a grain sack—was introduced. It was soon discovered that by good culture, if the season was favorable, in almost any part of the State enormous crops of grain could be raised. There were favored localities found, where, almost without regard to season, crops could be secured. To grow grain, and make large profits—and nothing short of this would satisfy the early Californian—large tracts were necessary; and the large holdings, that have so hindered the healthful advancement of the State, resulted from this grasping after land. For a time it was thought that grain growing and grazing were the coming industries, and that the prosperity of the State would be far greater under this regime than from mining. The end, however, was not yet. There has dawned a new era, the era of fruit culture—its symbol a fruit box. The result is that the grain fields are being planted to vines and trees; that cattle and sheep ranges are being subdivided, and the available parts broken up and planted. The last twenty, even the last ten years, have wrought a miracle upon the face of our land.

In the second period of our horticultural history, fruit culture was still a very minor consideration—a very small incident in the history of the lives of the fortune hunters who poured into California in search of the glittering ore which was to enrich them. A few men not wholly weaned from the memories of their Eastern homes, brought with them across the plains or the isthmus, seeds of choice fruits from the old orchards. These were planted, flourished, and bore fruit around the miners' cabins. Others seeing the great demand for fruit—an article exceedingly scarce in those early days, when an apple or a peach would sell for a dollar or more—thought there was a mine of wealth in an orchard; and trees were procured from Oregon or the East at great cost and planted in the old mining camps, where the oldest orchards are now found. This was the commencement of the fruit industry, as a business, in our State. Many of these old orchards exist to-day, but with the decadence of the mining industry, they have been neglected, and to-day cut no figure in horticultural importance. They were, however, the pioneers of the industry, and proved that California would excel in fruit growing as she has done in all else. The discovery of gold was speedily followed by the planting of fruit, and as early as 1848, Peter Weimer, an employé of James Marshall, at Coloma, in El Dorado County, planted some apple seeds procured from dried fruit imported from the Eastern States, and from this source, in a few years, had an apple orchard, which yielded him good returns for many years after.

The first peaches grown and marketed in California, so far as known, were raised by A. P. Smith, on the American River, and sold by W. R. Strong, then a fruit dealer in Sacramento, at $1 50 and $2 each. The first apples found in the California market were imported from Chile in 1852, and sold at 75 cents per pound. The first apples grown in the State were raised by A. P. Smith, of Sacramento; Briggs Bros., of Marysville, and a Mr. Lewelling, of San Lorenzo, Alameda County. Which of these takes precedence it is difficult to state, as all were engaged in fruit growing at the same time and rank as the pioneer orchardists of the State.

For many years, fruit growing in California was largely experimental. People came here from the East with ideas acquired under Eastern conditions, and they planted Eastern varieties and followed Eastern methods. Orchards were generally small in extent and mixed in variety. Experience in time demonstrated what varieties of fruit were best adapted to our State and to the different parts thereof. The nature of our soils and peculiarities of our climate were learned, varieties especially adapted to peculiar conditions were discovered or produced, and fruit growing in California became a science as well as a business. The difficulties that beset its early history were overcome, and at last horticulture, established upon a secure footing, made such rapid strides that in a few years California rose from an insignificant place among the fruit-producing States of the Union, to become the orchard of the United States.

While early in the fifties there were numbers of small orchards, it cannot be claimed that the fruit industry existed as a business until twenty years afterwards. No one in those early days dreamed of growing fruit for export, nor would any one have believed that it could ever be done, and no systematic fruit growing to any extent was attempted. The orchards were, as a rule, accessory to more important pursuits—not the principal pursuit as they are to-day; and it was not until 1870 that fruit growing in California became established as an independent business.

The completion of the railroad to the Eastern States very largely assisted in its growth. For while there was little fruit shipped East for several years after the completion of the road, a demand for California fruit sprang up along its line, and gave an impetus to the new industry. The demand has since that time continually increased and spread, until to-day the orchard industry of our State leads all others, and California ranks first among the fruit States of the Union. The industry is a rapidly growing one, too, and the next five years will see the output of the State doubled. Our fruits to-day, in various shapes, green, dried, canned, preserved, and manufactured into jellies, raisins, wines, and brandies, are shipped to every corner of the world. With the increase of our output, and the larger demand for our products, there has been a steady decrease in freight rates, until they are to-day but little more than one third of what they were in 1871.

As showing the rapid growth of the orchard industry in our State in the past two decades, the following table is appended:

Year.	Fresh Fruit—Pounds.	Dried Fruit—Pounds.	Raisins—Pounds.	Canned Fruit—Pounds.
1871	1,832,310			
1872	2,039,972			182,090
1873	2,896,530			678,580
1874	5,029,840		220	457,290
1875	2,993,720	548,227		759,040
1876	4,201,730	690,770	68,440	1,529,910
1877	3,818,310	730,710	239,260	1,731,530
1878	2,866,420	259,170	192,890	1,700,950
1879	3,126,400	1,761,750	942,770	3,111,680
1880	3,141,500	412,480	661,660	6,707,650
1881	7,248,300	2,074,420	1,490,320	18,768,200
1882	7,919,340	4,532,350	865,770	25,163,190
1883	19,222,580	3,097,960	295,050	26,397,700
1884	11,996,070	2,102,350	3,150,290	21,696,740
1885	45,386,740	5,794,160	6,203,340	28,949,380
1886	49,665,650	6,113,970	12,970,800	30,636,710
1887	50,732,990	16,648,520	15,976,500	56,009,130
1888	53,741,670	19,759,140	16,884,570	39,281,340
1889	50,053,050	33,132,050	39,313,740	37,083,725
1890	68,084,124	64,596,181	41,120,330	80,121,950
1891	98,680,100	65,090,220	44,964,850	49,566,080

The figures given are those of the Southern Pacific Railroad Company, except those for 1890 and 1891, which represent the amount carried by the Santa Fe and Southern Pacific systems.

There was shipped by sea, in 1891, 15,223,440 pounds of fruit.

The vast importance of the fruit industry at the present time cannot be better shown at a glance than by a summary of the fruit shipments out of our State in 1890. This is shown as follows:

Total carloads, all kinds, Southern Pacific Company	11,948
Total carloads, all kinds, Santa Fe system	4,246
Total pounds, all kinds, both systems	323,915,185
Total carloads by both systems	16,194
Total cars for each day of the year	44
Total carloads shipped in 1880	546
Excess in 1890 over 1880	15,648

The total carloads of both systems during the year 1890 would make a solid train of cars 123 miles long.

The future importance of the industry can be estimated by its growth in the past. In twenty years our shipments have grown from nothing to 20,706 carloads in 1891. At the present time not over 25 per cent of the orchards planted are in bearing, and not over 5 per cent have reached their maximum. Taking round numbers, and placing the output at the lowest figures, the conclusions reached are startling. We have now in the State at least 200,000 acres in orchard. This will all be in bearing in five years, and allowing 100 pounds to the tree—a small estimate—and we get the following figures:

Acreage now planted	200,000
100 trees per acre	20,000,000
100 pounds to the tree	2,000,000,000
Tons	1,000,000
Carloads	100,000

Who dare say that the era upon which we have now but entered shall not lead our State to a far higher condition of prosperity than she has yet reached? While mining for the precious metals will still continue, yielding its millions for the State, and while grazing and grain growing will always be largely followed (for all healthful industries continually overlap), fruit growing is destined to be the great interest of California, and for the millions that either of the other industries may bring it will show its tens of millions.

IMPORTANCE OF HORTICULTURE TO CALIFORNIA.

The advantages of this industry to the State can hardly be overestimated. When it is stated in bare figures that so many millions of pounds of fruit have been exported, and that so many thousand dollars have been brought into the State in exchange therefor, however great the showing may be, the half has not been told. Horticulture is most emphatically a home-making industry. One needs but to contrast the condition of certain localities in Central California, as they are, with what they were a few years ago, to realize what a change can be made by this industry even in a few years. Then, for many months of the year, the country seemed a barren waste, with here and there great bands of sheep or cattle, eating grass, flower, and shrub, until the picture was one of sheer desolation. A few uncouth vaqueros with their wild mustangs and wilder ways, were about the only human beings to be seen. Houses were separated by leagues of distance, and when one was found it stood in some bleak place, where the desolation was seemingly greater than in the open fields. A great corral, a broken-down shed, where refuse was cast, perhaps a windmill to furnish the water, a number of fierce looking dogs, and that was all.

No garden, no vineyard, not even a tree or shrub to keep off the fierce rays of the summer sun. In fact, there was nothing that had, even in a remote degree, the semblance of a home. And though it were a grain ranch, there was but little difference. In the growing season there was a period during which the restful green of the waving crops delighted the eye, and later, when the golden color foretold the harvest of gold; but during the rest of the year the same desolation was apparent. Houses few, small, and far between. Nothing approximating a neighborhood, no church, few schools, and these necessarily so far from most of the dwellings that the children reached them on horseback; and, of course, little or no opportunity for social culture or the refinements of life.

Around the dingy houses, lying uncovered during the entire period when not in use, were the plows, the harvesters, and the other implements necessary in planting and securing the crop. A few cabins, perhaps, where the "blanket men," employed for a few weeks during harvest, could store themselves, and little more. Neither of these is an inviting picture, but they show California as it was for many years under the second era.

There were, of course, exceptions. Here and there, at very great intervals, a *home* would be found—a plain, but tasteful residence with comfortable outbuildings, a small, thrifty garden, a family orchard, and several of the other belongings of civilization. But even here there was almost an entire lack of companionship; there was properly no community. It is a wonder that so many good men and better women lived so long in this isolated manner.

But by far the most deplorable effect of these phases of life was seen in the children reared amid such surroundings; and the children of one day are the men and the women, the citizens, of a very near to-morrow. To the boy only one avenue was open—the life of a vaquero. His pony carried him to school, and became his closest companion. He early learned to "throw a rope," and accompanying this there were other lessons in language and habits—such lessons as are not conducive to either manliness or honesty. The ideal constantly before his eyes was, too often, a mustached man, wearing a broad-brimmed sombrero, buckskin trousers with fringed seams, jingling spurs, a Mexican saddle, with rawhide lariat so attached that it could be loosened in an instant and used as a lasso. His ambition was to be such a man, to smoke cigarettes, swear, carry a couple of revolvers in his belt and a bowie knife in his boot. This was the embryo man of the coming California. And the girl reared here—God pity her—what could she look forward to in the future? It seemed all a blank until she should be old enough to think of a vaquero lover, in his best cowboy attire. This might be her career, or she might possibly become so worldly-wise that, conscious of the powers of her charms, she resolved to win a rich husband who would remove her at once and forever from her unpleasant youthful surroundings.

This picture of what California was, and what some of it now is, is not overdrawn. But all this has changed where horticultural pursuits are in the ascendant. Even the face of the country has changed. It now is finely diversified by vineyards and orchards, different varieties giving off different shades and tints, until the picture is one pleasant, indeed, to behold. These different shades of green last all through the spring and summer, until the richer, clearer hues of autumn and winter take their place. The look of desolation is no longer there. Houses have sprung up as if by magic, for successful fruit raising means small holdings. It requires no gift of prophecy to foretell that in the near future the man who raises his product on a small tract, upon which he and his own family can do the whole work, will be the man who will achieve the greatest success. These houses put on the characteristics of a home. There is a flower garden in front, a family garden and orchard in the rear; there are neatly kept fruit houses, and storehouses for implements that must be well cared for; there is everywhere the appearance of thrift. There is now a neighborhood; social intercourse is easy; schools so near, and because now they must be; so good, that every child may receive their benefits. Churches and assembly halls, and even public reading-rooms are found, and society has, in a marked degree, put on the garb of civilization.

But more than this, in this home-making every member of the family has his part. There is the opportunity, and fortunately many times the necessity, for pleasant and more or less constant work for all who are able to work. Instead of the family being made up of one producer, and all the rest merely consumers, here all are producers. Whenever and wherever this is the case prosperity reigns. The children here may be, and should be, trained to habits of industry, habits of thrift. This gives to both the boy and the girl a purpose in life. There is something to do, and therefore something to be. Associations upon the plane of a common industry are among the most pleasant in life. And these associations, easy now because neighbors are near, tend to give to the children a culture and a refinement rarely seen in other communities.

Successful horticulture requires the quick eye, the skilled hand, and the trained intellect. It is not mere groveling labor, but, in the main, intelligent, inspiring work. The good effects of introducing children pleasantly to an industry of this kind are apparent to every one who has had the opportunity to observe them. The aim to be an intelligent, successful fruit grower, or to be the center of a cultured home in a rural community, where all the necessities and many of the luxuries of life are at command, will be far more likely to lead the children to a higher and better life, than the purposes that actuate children reared under different circumstances.

The fact that success in horticulture depends so largely upon the intelligence of the operator, and that there is a constant need for reaching out, in all its departments, for more knowledge, makes it an exceedingly attractive occupation for persons of some culture. As a result of this, it will be found that our fruit growers are, as a class, men of brains, and men who have, if not already wise in their particular department, both the inclination and the ability to acquire rapidly the necessary amount of information. The mind as well as the hand must be kept ever busy. That such men are mainly in charge is abundantly indicated by the manner in which our orchards are kept and handled. Fruit growers from the East are always surprised at our clean and thrifty orchards. A slovenly kept place is an exception. The inculcation of habits of neatness and of order, all of which become necessary to success in horticulture, is not one of its least advantages.

So far, it has not been enumerated as one of the benefits of horticulture that it increases the income per capita, or that it largely increases the assessment roll in any county. These are both true, and these increases are far greater than most people imagine. But what is said here has been written to show that there is a prosperity that does not appear upon the tax roll and an advancement that can never be estimated in mere dollars and cents. It is this higher prosperity, this truer advancement, as well as the other, that horticulture is bringing to our State. In the not very distant future, when our fruit-growing area shall be subdivided, as it will be, into thousands of small holdings, and on each of these shall be found a cultured, happy, and industrious family, then we shall have reached the truly golden age. It is rapidly coming and nothing can stay its progress. Then, instead of being noted chiefly for its "wild and woolly ways," or for its large pumpkins and larger stories, California will be celebrated as being the home of the most enlightened, progressive, and happy people in the world.

HORTICULTURAL ADVANTAGES.

California's first great advantage comes from its geographical position. An ocean-bound length of nearly 800 miles, other conditions being such that there is but little marked difference in temperature, and of a width varying from 50 to 150 miles, before reaching the barren portions of the Sierra, give an area so extended that it may well be called an empire.

A very large portion of the entire Coast Range is admirably adapted to horticulture. From the little plains bordering, in places, on the ocean, the horticulturist has been gradually creeping up the foothills, until, in many places, the very summits have been reached, and all through this area he has found excellent fruit land. Indeed, it has been found here, as upon the valley side, that the fruit grown upon the foothills and mountain tops is superior in flavor, and often in size, to that grown in the valleys. Through all this region the apple, the pear, the plum, the prune, the cherry, the olive, and the fig are grown in great luxuriance. Except upon the very summits, where the sometimes semi-ocean winds, in blossoming time, interfere, the apricot, the nectarine, and the peach find a congenial home, while the grape does almost equally well in all parts of the State.

Toward the south the orange, the lemon, the lime, and even the banana, are successfully grown, while the nut-bearing trees thrive wherever they have been planted throughout the entire extent. On the coast the temperature is more equable than in the interior valleys, and during the growing season the fruit is frequently bathed in the ocean fog. Fruit grown here differs in many respects from that grown more inland, and is often several weeks later.

The coast-belt fruit area comprises the Coast Range, including the foothills on both slopes. The northern part of this is, as yet, somewhat inaccessible, and has therefore been but little tested, but the characteristics can differ but little from those of the southern part.

The soil is, throughout the entire extent, remarkably fertile. The very summits are in many places covered with a deep black sandy loam, the ideal soil for fruit. Upon the slopes may be found every variety of soil, as there is of exposure. To determine the kind of fruit, and the varieties that will thrive best in a given soil, and having a given exposure, requires the exercise of great judgment, and only by careful experiment can all the questions that arise be settled. The fact that such problems are constantly arising, upon the solution of which success or failure largely depends, renders it necessary that one who would succeed in horticulture must be a close, thoughtful student.

The rainfall in this ocean belt is everywhere abundant, and irrigation, except in the southern portion of the area, largely unnecessary. An exception to this may be made in reference to citrus fruits, and, of course, to berries and other small fruits.

In the great inclosed valley, the advantages are of a somewhat different nature. The temperature, except in certain favored localities, is not so equable, the rainfall not so great, nor is there, in the valley proper, the opportunity for selecting the exposure. The soil is abundantly fertile, and responds generously to good culture; the rainfall in most places sufficient, and where not, water is easily obtained, either from artesian wells or mountain streams. Nowhere in the valley, nor on the western hills—not until the upper Sierra is reached—is it ever cold enough to kill peach or apricot trees. The orange and other citrus fruits thrive as far north as Butte County, and are grown in protected places even in Tehama and Shasta.

In this valley, and the lower foothills on either side, peaches, nectarines, and apricots are more productive than upon the Coast Range, and the fruit, in most cases, of better quality. The apple does not do so well, the fruit lacking flavor and consistency, but pears reach great perfection. Here is the home of the raisin, and all the finer varieties of grapes make luxuriant growths.

The second marked advantage possessed by California is that our trees and vines begin bearing at an earlier age, and bear uniformly more abundant crops than do trees and vines in any other locality. This fact can be easily verified, by even a casual observance of our fruiting fields. The two conditions of soil and climate seem to be in accord to produce this result. It is not an uncommon thing to see a two-year old peach orchard or vineyard carrying crop enough to add materially to the income of the grower; and a statement of the number of pounds of fruit grown upon our older vines, and upon our well-developed prune or pear trees, even when entirely within the limits, is apt to be received with incredulity. One of the causes of this productiveness is discussed hereafter.

The third advantage is the quality of our fruit. Well-grown, well and naturally ripened California fruit is of a better quality—making quality dependent upon texture and flavor—than that raised upon the Atlantic slope. Our mountain apples—those from Humboldt, Lassen, Modoc, Del Norte, and Siskiyou Counties—are not to be excelled.

In the very nature of things this must be so. All through the growing season our fruits are having forced into them, from the root development of the plant, their nutrition. The exceedingly dry summer air is constantly extracting the moisture from the fruit through the skin, leaving behind the pulp, the saccharine matter, and the peculiar fruity flavor. The product is thus more concentrated than is that grown under other conditions. To realize this more fully compare a box of peaches dried at Fresno or Marysville with a box prepared anywhere on the South Atlantic slope. The peaches in one case will be light-colored, plump, flexible, having a distinct and strong peachy odor, and the skins will be nearly devoid of the thick downy covering so unacceptable to the palate. The other will be dark, hard, with a bitterish odor, if any, and the skin will be tough and covered with a thick resistant fuzz. This is caused not so much by a difference in preparing and handling as by a difference in original growth. Our inland counties produce a peculiarly characteristic fruit. In fruit grown upon the west side of the Coast Range this characteristic is by no means so apparent. California prunes and California raisins, for the reasons given above, have won and will continue to win unqualified approval wherever well known. No reference is here made to size, as that point—not always a point of excellence—is conceded.

Scientific research has developed and abundantly confirmed the fact that the highest degree of perfection in ripening most fruits is reached only in abundance of sunlight. The long period of continuous sunny days during the ripening time gives to California a peculiar advantage, probably possessed by no other place. And if the sugar secretion and luscious flavor are induced, as they probably are, by the action of the actinic or chemical rays, then the clearness of the atmosphere and its freeness from moisture contribute largely to the same results. The same reasons that enable our photographers to make such superior pictures, are, in the same way, giving us superior fruit.

The peculiar hot-bed nature of our coast is another advantage that we possess. The effect of this is shown in early production, in great crops and enormous size, and also in the luscious quality of the product. A more marked exemplification of this is observable in matters of propagation: Grape cuttings stuck into the ground with any kind of care, root readily; many varieties of pears, some of the prunes, and, in short, anything that will "strike" in an ordinary propagating house, will root here in the open air. The conditions are all the same, except the covering to retain the moisture. It is again shown in the effects of frost—for frosts do occur here. A frost that "on the other side" would kill all the tender vegetation, is here harmless, its effect being, in whole or in part, neutralized by the radiant heat. Nothing surprises an Eastern visitor more than this.

The great advantage we have in gathering and handling our product is very pronounced. The rainless season, the dewless nights, and the dryness of the air, make it possible to leave our fruit outside without protection, and with little if any fear of molding. For drying, our climate is unsurpassed. During much of the drying season, in favored localities, fruit spread upon trays and left upon the ground, dries every hour of the twenty-four. As, from the amount of our crop, much of our fruit must necessarily be dried, this advantage can hardly be overestimated.

With all the advantages that have been named, and none of them are overstated, it is no source of wonder that our horticultural interests are advancing with majestic strides. The present output will be doubled in five years, and new areas are continually being planted. As has been remarked, there is much of the State yet undeveloped. When this shall have been fully developed, and when intelligent observation shall have determined what varieties of fruit will best succeed under all the varying conditions of soil, climate, and exposure, it will happen, it must happen, that California will furnish fruit to the world.

It needs only that we secure ample means of distribution, that the excellence of our product be made known, together with the fact that it can be produced and furnished at a price that will bring it within the reach of all, and there is little fear but that consumption will keep pace with production, and that however large our product may be, it will eventually find a ready market. When the sanitary value of a partial fruit diet comes to be understood, and when people learn what in the end they will learn, that well-prepared fruit, even if it be dried fruit, is more palatable and far more healthful, especially for children, than a meat diet, and that it is besides far more economical, the market can hardly be oversupplied.

The advantages of California in the line of grape culture are even more marked. With every adaptation of soil and exposure, there are probably no varieties that may not be made at home here. There is reason to believe that in the line of wine grapes, California can produce grapes, the wine from which will equal, if not excel, that of the most celebrated vineyards of France or Spain. Our climate allows the grape to hang uninjured on the vine until it is fully ripe, and this period may be extended to weeks after, if desirable. In fact, grapes are better preserved hanging on the vine than in any other way. This ripening, and even partial drying out after ripening, has a marked effect upon the qualities of the wine produced. The field of viticulture is exceedingly broad, and has, as yet, been but fairly entered.

The fact that raisins can be and are cured in the open air and among the vines, makes it possible for us to produce them at a moderate cost, and the quality has already spoken for itself. The raisin industry can be extended to an almost unlimited degree, as nearly all of the valley portions of the State, with the surrounding foothills, are well adapted to it. In this, as in viticulture, there is much yet to learn, but our growers are becoming apt pupils.

Table grapes grow to great perfection. The fact that they may be left upon the vines almost indefinitely gives an extended period in which to gather and market our crop. It rarely happens that the grape grower cannot gather luscious grapes from his vines to grace his Christmas dinner. More rapid means of transportation and improved methods of packing and handling the crop will widely extend the market of our table grapes.

CHAPTER V.

IRRIGATION.

The question of irrigation is one of the most important now confronting our people, and has a direct bearing upon the matter of horticulture. In many parts of the State, under the magic influence of water, the desert has been converted into a garden, and what was at one time considered the most valueless has proved the most valuable land. It may be affirmed that irrigation has made all of Southern California, for while there are large tracts upon which vegetation will flourish without artificial watering, these are small in comparison with the vast area which has been converted from an absolutely desert condition to one of wonderful fertility beneath its influence. All through the San Joaquin Valley great attention has been of late years given to irrigation, and the result is the gradual conversion of that vast wheat field into orchards and vineyards, the cutting up of tracts, thousands of acres in extent, into small holdings, and the building up of tens of thousands of homes, with flourishing cities and modern improvements, while before its introduction these were but scattered hamlets and uninhabitated plains. It has made possible the settlement of vast areas of public lands, and changed the face of the whole valley. Of course, in various parts of the San Joaquin Valley naturally damp land is found, and cereals, which are a winter crop, grow without irrigation; but horticulture and irrigation in the San Joaquin Valley are companion industries, and the former could not exist without the latter. On the western slope of the Coast Range climatic conditions are very different to those of either Southern California or the San Joaquin Valley, and irrigation is less of a necessity, although it is a great aid to the fruit grower in many localities.

In the Sacramento Valley irrigation is not so extensively resorted to as it is in the San Joaquin Valley, but in the counties on the western slope of the Sierra it is obtaining a strong foothold and increasing with the increase of the area in orchard. West of the Coast Range and north of San Francisco irrigation is not required, nor is it resorted to in the mountain counties, climatic conditions, as has been explained elsewhere, rendering irrigation unnecessary.

Irrigation was originally resorted to as a make-shift in those sections of the State where crops could not be grown without its aid, but it developed so many advantages over the uncertainties of the older system—that of depending upon the weather—that it took a deep hold on the people, and grew in popularity until it has spread over a large portion of the State, and is still increasing, even in such places as have ordinarily an abundant rainfall to insure crops. Land upon which crops will grow, especially in the summer months, is very limited in comparative area, and land to be made profitable for fruit requires irrigation. Herein, too, lies the great advantage enjoyed by the California farmer over his Eastern brothers. He has no fear of drought. There is no uncertainty about rainfall, for when his crops show signs of requiring moisture, he does not look at the clouds and depend upon nature, but has the life-giving current at his command, and supplies it to his crops as it is required. What at first was mere expediency, has resolved itself into a necessity, and no Californian who depends upon irrigation for his crops would exchange with the Eastern farmer, who has to rely upon the uncertainties of the weather for his.

Nothing will more conclusively prove the importance of this great subject than the growth of California during the past decade, and the fact that that growth has been wholly in the irrigated counties. During the past ten years California has gained at the rate of 39 per cent in population. The cause of that gain can be seen when it is known that thirteen counties of the State have lost in population from 1 to 73 per cent, while fifteen, including the most important irrigated areas, have grown more rapidly than the State at large. In the counties that have fallen back, mining, stock raising, and lumber industries have been the principal support. In the fifteen counties that have grown so largely farming pursuits under irrigation have become the chief feature of their development. The total population of the State in 1880 was 864,552. In 1890 it was 1,203,969. The gain in the eleven counties most deeply interested in irrigation has been over 753 per cent. The percentage is as follows:

	Per cent.
Fresno	228
Kern	79
Los Angeles	234
Merced	36
Orange	244
San Bernardino	227
San Diego	206
San Luis Obispo	77
Santa Barbara	66
Tulare	120
Ventura	98

The principal irrigation centers of the State are the counties of Los Angeles, San Diego, San Bernardino, Kern, Tulare, Fresno, and Merced. In the twenty years from 1870 to 1890 the population of these counties will be seen to have increased at a far greater rate than that of any other of the interior counties. These figures are well worth studying:

	1870.	1890.
Los Angeles	15,309	101,410
San Diego	4,951	34,878
San Bernardino	3,988	25,486
Kern	2,925	10,031
Tulare	4,533	24,875
Fresno	6,336	31,877
Merced	2,807	8,162

The seven leading irrigation counties showed the following remarkable increase in wealth for the twenty years covered:

	1870.	1890.
Los Angeles	$6,918,074	$67,121,610
San Diego	2,539,957	27,703,520
San Bernardino	1,202,482	22,490,440
Kern	1,974,856	10,389,154
Tulare	3,456,766	21,742,827
Fresno	3,219,230	35,539,655
Merced	3,202,455	13,368,921

It is safe to say that nine tenths of this remarkable increase in wealth is due to the irrigation enterprises that have been carried out in the counties referred to.

The importance of irrigation, not in our State alone, but in the whole of what is known as the "arid region," is shown by the attention which is being paid to it and the vast areas of new land being put under ditch each year. In 1886 the reclaimed area was reported at 5,500,000 acres. In 1890 this had increased to 15,112,106; in 1891 it had swelled to 18,533,107, and with the completion of the works now under construction this will be increased to 25,000,000 acres which can be irrigated and made of use to the horticulturist.

The following table is a condensation of the results secured by statistical inquiry as to the irrigated area of the arid States:

States and Territories.	Estimated under Ditch.	Acreage under Cultivation, 1891.	Number Artesian Wells, 1891.
Arizona	660,000	315,000	42
California	4,500,000	3,550,000	3,500
Colorado	3,007,050	1,800,000	4,500
Idaho	1,200,000	330,000	12
Kansas (west of 97° long.)	990,900	120,000	50
Montana	1,250,000	419,000	36
Nebraska	200,000	40,000	100
Nevada	150,900	75,000	76
New Mexico	700,000	405,000	10
North Dakota	2,500	2,000	670
Oregon	125,000	45,000	6
South Dakota	100,000	54,000	950
Texas	350,000	160,000	1,000
Utah	735,000	423,000	2,524
Washington	175,000	75,000	10
Wyoming	3,031,484	185,000	6
Totals	17,177,834	7,998,000	13,492

As indicating the change which irrigation works in a country, the "Kern County Gazette" draws a comparison between Kern County before and after the introduction of irrigation, which would apply equally to every county of the San Joaquin and Southern California. It says:

"Twenty years ago Kern County was an almost unknown factor in California. Bakersfield was a little hamlet where supplies were obtained by the sheep and cattle herders and miners, who were sparsely scattered through the valley and in the mountains. There were no railroads within hundreds of miles, and the agricultural possibilities of the soil were not even suspected. Vast areas that are now highly productive were regarded as utterly worthless. To be sure, there were large streams running down the mountain into the valley, but their waters rolled on unheeded, while the vast plains on either hand were classed as desert land.

"But there came enterprising and far-seeing men, who saw the possibilities that inured in the union of the land and the water. Backed up with immense capital, they set systematically at work in the development of a system of irrigation canals that has been declared, on the highest and most unprejudiced authority, to be the finest in the State.

"As the first result of the diversion of the water upon the arid plains, Kern County now boasts of the largest alfalfa fields in the State, covering tens of thousands of acres, and is supporting myriads of sheep, cattle, and horses of the best grades. No county in the State ships so many fat sheep and cattle and fine horses to the San Francisco market as this. Potatoes, corn, and other farm products are also produced in large quantities and of the finest quality.

"Of late, however, horticulture has received a large impetus, and thousands of acres of vines and trees have been planted. The soil and climate are particularly adapted to the raisin grape, and a large area has been planted to Muscat vines. Other fruits have also been largely planted, the peach particularly receiving much attention, and returning handsome profits."

The passage of the Wright Irrigation Act, on March 7, 1887, providing for the formation of irrigation districts, and the bonding of real estate therein for the purpose of acquiring water rights and building waterworks, gave a great impetus to this work, and a number of districts have been organized under it, of which the following table gives a list of thirty-three, with their location, names, and Post Office addresses of their Secretaries; acreage, amount of bonds voted, and the cost of supplying water per acre:

District.	Secretary and P. O. Address.	No. of Acres.	Bonds Voted.	Bonds per Acre.
San Bernardino—				
Allessandro	G. H. Kelsey, Moreno	25,000	$765,000	$30 00
Citrus Belt	D. A. Barras, Colton	12,160	800,000	65 78
East Riverside	J. A. Vanarsdale, Colton	3,000	250,000	83 33
Grapeland	E. T. Meyers, Grapeland	10,787	200,000	18 54
Rialto	D. Robinson, Colton	7,200	500,000	69 44
San Diego—				
Elsinore	W. H. Townsend, Elsinore	11,300	none.	....
Escondido	A. J. Werden, Escondido	12,814	450,000	35 12
Fallbrook	G. A. Scott, Fallbrook	12,000	....	....
Murietta	J. C. Mason, Murietta	15,600	none.	....
Perris	H. A. Plimpton, Perris	22,680	442,000	25 00
Spring Valley	....	22,000	none.	....
Pleasant Valley	W. P. Milliken, San Jacinto	20,000	....	....
Los Angeles—				
Big Rock Creek	Ira Carter, Llano	30,000	400,000	13 10
Monrovia	....	....	....	....
Orange Belt	F. P. Firey, Pomona	4,500	200,000	44 44
Palmdale	C. W. Dodenhoff, Palmdale	50,000	175,000	3 50
Vineland	I. N. Rhodes, Vineland	4,500	50,000	11 11
Dehesia	....	....	....	....
Orange—				
Anaheim	B. V. Garwood, Anaheim	32,500	600,000	18 46
Colusa—				
Orland, South Side	L. P. Behrens, Orland	25,000	100,000	4 00
Central	R. De Lappe, Maxwell	156,550	750,000	4 78
Kraft	J. W. Rodgers, Orland	13,500	80,000	5 93
Colusa	....	100,000	600,000	6 00
Tulare—				
Tulare	E. Oakford, Tulare	34,149	500,000	14 64
Kern—				
Poso	J. E. Anderson, Spottiswood	40,000	500,000	12 50
Kern and Tulare—				
Kern and Tulare	J. O. Sidener, Delano	80,000	700,000	10 56
Fresno—				
Madera	E. H. Cox, Madera	305,000	850,000	2 78
Fresno and Tulare—				
Alta	G. H. Weaver, Dinuba	129,927	675,000	5 19
Sunset	M. McWhorter, Selma	363,400	....	....
Selma	W. L. Chappell, Selma	271,000	none.	....
Stanislaus—				
Modesto	C. S. Abbott, Modesto	81,500	800,000	9 81
Stanislaus and Merced—				
Turlock	R. M. Williams, Ceres	176,210	600,000	3 40
Yuba—				
Browns Valley	J. McFarlane, Browns Valley	43,000	110,000	2 56
Totals	....	2,106,775	$11,197,000	$8 04

This law has been in operation now for a sufficient time to prove its benefit, and under its operation a great deal of the arid land of California has been and is being made productive, especially for horticultural purposes. As the irrigation facilities of each of the counties are mentioned under their respective heads, it is needless to more than briefly allude to the matter in this place; suffice it to say, that successful horticulture in our State depends largely upon irrigation.

CHAPTER VI.

ADAPTATION OF FRUITS AND PLANTS.

In a State that is comparatively new, and in an industry that is newer, the determination of what varieties will best succeed in different localities becomes a matter of paramount importance. A considerable part of California is yet an unexplored region horticulturally. So many factors enter into the equation determining the question of adaptation that a careful observer will be slow to assume, and slower yet to assert, that his judgment is infallible. It is so easy to overestimate some of these factors, and to omit others, and it is but prudent to exercise great caution in planting in any untested locality. It requires the observations not only of one year, but of a series of years, before one can feel reasonably confident that he is right in his conclusions. Many of these points can be safely decided only by the final crucial test, experiment. From a lack of this caution many lamentable failures have been recorded. It was assumed for many years that citrus fruits would thrive only in valley lands, but experiment has shown that the mesa and foothill lands produce as large a crop, and of better quality.

For years it was thought that apricots, nectarines, peaches, and even grapes, would mature to perfection only with a southern and western exposure. Again experiment shows that a northern exposure gives a longer lived tree and equally well matured fruit.

In localities where facts have been clearly demonstrated there is little danger of going astray. And yet, locality is sometimes not a well-understood term. There are many places where a difference of half a mile in distance and five hundred feet in elevation change the whole matter of adaptability.

APPLE.

(*Pyrus malus.*)

The apple is the world-renowned fruit of temperate climates, and is most universally used. In California nearly all the varieties known in Europe are grown and flourish exceedingly well, and also those of Asia. The standard and favorite varieties, however, are mostly of American origin.

Upon our upper foothill and mountain land the apple produces abundantly, and of excellent quality. The apple grows in the warmer valleys, but although of good size and fair to look upon, it is too often faulty in both texture and flavor. This deduction in reference to the growth of the apple is very general, but has been pretty clearly demonstrated by experiment: A northern or an eastern exposure is better than one to the south and west.

There is a vast area of territory in California upon which the apple does phenomenally well. In many of the coast counties, where the temperature is not too high, in some of the foothill regions of the Sierra and Coast Range, and in the higher mountain counties, apples are the standard fruit crop, and the fruit produced there cannot be surpassed in size and quality. To those who have good apple lands adjacent to means of transportation to the centers of demand, apples have proved remarkably profitable. In many of our coast and mountain counties, and in the higher altitudes of the interior valleys, apple growing is rapidly assuming its proper place as a profitable industry.

PEAR.

(*Pyrus communis.*)

The pear tree is a native of Europe and western Asia. It was introduced into California over a century ago by the Franciscans, but the trees they planted were seedlings and of inferior kinds, yet they ranked as favorite among the people then. One, a yellow pear, ripened about June 24th, and that being St. John's day, it was named "Pera de San Juan" (pear of St. John). This pear is still cultivated. Another was known as the Hog pear, "Pera de coche," and a long, dark, pyriform pear as "Bergamota." When the first pear trees of foreign origin were introduced into California it is difficult to say, but it occurred somewhere about the year 1846. From that time on the pear has proved itself one of the most hardy and most profitable fruits of California.

The pear seems to adapt itself to diversity of soil, climate, and exposure more readily and more fully than does the apple. It therefore grows to perfection over a much wider range of the State. In the hot valleys, upon the hillsides, in the cooler parts, and under greatly differing conditions of soil, it thrives almost equally as well. All the European and Asiatic varieties succeed here, and almost every variety has been introduced. The pear area is being rapidly enlarged.

PEACH.

(*Persica vulgaris.*)

The peach, as its name indicates, is a native of Persia. It was introduced into California more than a century ago, but the kinds then known were very inferior. Foreign sorts were planted as early as 1846, and soon after this, by the selection and propagation of desirable seedlings, improvement began. The result is that we have here many choice varieties, some of the finest peaches in the world being of California origin.

This fruit thrives best in the lighter soils of our warm valleys and lower foothills. In localities suitable for its growth it gives something of a crop the second year after being set in the orchard, and usually continuous good crops thereafter.

The entire valley portions of the State produce good peaches, although in some of them irrigation is necessary to secure the best results.

NECTARINE.

(*Persica vulgaris.*)

The nectarine, undoubtedly a "sport" of the peach that has become constant, produces abundantly in the same localities that are adapted to peach culture, and under like conditions. The culture of the nectarine is in all respects the same as that of the peach, and its habits are also similar. The nectarine is a favorite fruit green and dried, and always finds a ready market.

APRICOT.

(*Armeniaca vulgaris.*)

In no other State in the Union does the apricot flourish so well, or yield such early and large returns, as it does in California. The culture of this favorite fruit in this country is entirely limited to the Pacific Coast, and to California in particular. The apricot is a native of Armenia, Arabia, and the higher regions of central Asia, and the varieties introduced from those countries have become acclimated and thrive abundantly well. Some of the choicest varieties, however, are selected seedlings, originating here. For canning and evaporating purposes, as well as for use in the fresh state, this fruit can hardly be excelled, and in sections adapted to its culture it is a source of great profit.

In the cultivation of most fruits, California is forced to compete with other portions of the United States, but for all practical purposes apricot growers have the entire world for a market. All the conditions necessary to the peach and nectarine are necessary to the apricot, and some others. In the warmer valleys, between the foothills and upon the protected sides of these hills, good crops are generally realized.

PLUM.

(*Prunus domestica.*)

The plum is a native of Asia and the southern part of Europe. Many varieties have been imported, nearly all of which do exceptionally well in certain localities. Plums do not come "true to seed," but a comparatively large number of the seedlings produce desirable fruit. From this cause there is a very great number of named plums, many of the most popular and favorite varieties having originated in America, excepting, however, those of the variety classed as "prunes." The boundary line between the prune and its parent, the plum, is not very clearly drawn; but those varieties that possess exceptional curing qualities, being rich in saccharine and having a firm texture, so that they can be dried in the sun or artificially without fermenting at the pit, are, by common consent, classed as prunes.

The commercial value of California's prune product is simply immense; and when it is taken into consideration that the prune was not introduced until 1856, and that for twenty years but little progress was made, it gives some idea of what to expect in the future.

CHERRY.

(*Cerasus.*)

The cherry is a native of Asia, but the choicest varieties grown in California are mostly of American origin, several of the best having originated in our own State.

In the different portions of the State which are adapted to the fruit, the cherry makes a fine growth and bears abundant crops. California cherries, like all other fruit products of the State, are remarkable for their size, flavor, and beauty of appearance. Their size dwarfs that of their Eastern competitors, and even the imported varieties. Where grown under favorable conditions of soil and climate the fruit is so much superior to that grown in the East as to cause experts to doubt whether they are the same variety.

The cherry crop of California aggregates a very large amount, and has always been found a remunerative crop under favorable conditions.

We have here growing the largest cherry tree in the United States. It was planted in 1853, and is 10 feet in circumference and over 80 feet in height. Its yield in 1891 was 3,000 pounds.

OLIVE.

(*Olea europea.*)

The olive is a native of the temperate seacoast regions of Asia and Africa and the south of Europe. The olive trees known in this State as the "Mission olive," are supposed to have been introduced by the Franciscans on an expedition to establish the Missions in this State in 1769. From seeds that were then planted at the Mission San Diego, the tree spread until it could be found among all the Missions established, and from these orchards were started, the importance of which was hardly conceived at that time. From the early plantings olive oil was made, which was not slow in coming into favor, and as its value as a food and a medicine became known that industry spread, and to-day it ranks among the leading industries of the State. Many new varieties have been introduced of late, and all thrive equally well, and in time their merits will be known, both for oil and for pickling.

Almost the entire State seems to be well adapted to the olive—the higher parts of the Sierra range and the low lands nearest the ocean, alone excepted. Olives grow with little moisture, and are, therefore, also suited to the drier portions of the State. They also seem to thrive well in light soil, and some of the best trees are found growing upon rocky points where probably no other trees would live.

The industry is, as yet, not very extensively developed, but bearing areas can be found from San Diego to Shasta County, and as all of them bid fair to become paying investments, there is every prospect that it will soon become a very important industry.

FIG.

(*Ficus carica.*)

The fig is one of the oldest of cultivated fruits on record. It is a native of the eastern Mediterranean region. The fig grows everywhere, except in the low, wet lands near the coast. It, however, grows luxuriantly in the hotter parts of the State. It will stand here a range of temperature from 18° to 120° F., and, except in places where the lower temperatures are reached, bears a continuous crop. In the drier situations it needs some irrigation, but upon the Coast Range it thrives well without it. The introduction of the finer varieties, and improved methods of handling the product, are making it quite apparent that the culture of the fig will yield a good profit.

GRAPE.

(*Vitis.*)

The grape is thought to have been a native of Persia, although its early history is somewhat in doubt. In California nearly every foreign variety is grown, either for a market product or as an experiment. Where care is used in the selection of soil and exposure, grapes of fine varieties grow and produce well over a wider range even than olives. The soil should be loose, sandy or gravelly, with good drainage. In some localities on the sand-rock ridges productive vineyards are found, where a casual observer would be inclined to assert that nothing would grow. Grapes, where market value depends largely upon the "coloring up" well, need a southern exposure, and color better close to the ground. The best table grapes are grown upon side hills so steep as hardly to admit of anything but hand culture, where the rays of the sun are thrown back upon them from the heated slopes.

The Eastern varieties are being grown to some extent, but many of these, to get a fair crop, have to be trellised, and that requires considerable labor. Every year new foreign varieties are being introduced, and California can show almost an infinite variety of good grapes. California raisins are known the world over, and this industry, although it is only the outgrowth of the past twenty years, ranks to-day among the most important of our State. The rapid increase in the output of raisins in this State has had the effect of very materially replacing the imported article, and we may confidently expect that in a short time the United States, instead of being an importer of raisins, will become an exporter, the product being extensively grown in California.

ORANGE.

(*Citrus aurantum.*)

The orange belongs originally to China and India, but when it was introduced into the State and how it came about, is difficult to say. The orange is at present one of the most important, if not the most important, fruit raised in California. Most of the trees grown originally were seedlings (trees grown from seed), and planted to orchard as such. In recent years many foreign varieties were introduced that became acclimatized, and others that were originated here have to a large extent taken the place of the seedling then grown. The quality of our oranges cannot be surpassed, and as evidence of this fact I need only cite the awarding of gold medals to California at the New Orleans World's Fair for the best twenty varieties against the *world*.

The orange is a tree of great longevity; there are numerous trees throughout the State more than a century old.

Of other members of the family we have the Pomelo (called "Grape Fruit," because of the fruits growing close to each other and appearing like great clusters of grapes), the Shaddock, the Kumquat, the Bergamot, the Tangierene, the Mandarin, and others. All thrive well and bear abundantly. But some of these, as the Shaddock and Pomelo, are only grown to a limited extent and more for ornament.

LEMON.

(*Citrus medica limonum.*)

Interest in the culture of the lemon has of late shown a marked activity, and vast areas of land are annually being set out to lemons. There are many portions of the State especially adapted to the culture of the lemon, which has been found a very profitable fruit to grow. The difficulty heretofore experienced in handling and shipping the lemon has been overcome, through the discovery of the proper method of curing, packing, etc. The lemon is an ever-bearing tree, and shows flowers and fruit in different stages of growth throughout the year.

CITRON.

(*Citrus medica cedra.*)

The citron is one of the many fruits that were introduced by the Franciscans. It grows and fruits well wherever the orange grows. Its cultivation is very simple. Choicer varieties are now being introduced, and there can be no question but that in time the California preserved citron will supplant the foreign product in our markets.

LIME.

(*Citrus medica limetta.*)

The lime is the least cultivated of all the citrus fruits of California. It grows and bears well, but requires sheltered nooks, exempt from frost, to bear regular crops, although the tree succeeds in soils unsuitable for the growth of the orange. There is no reason why the lime could not be more largely grown, and why the manufacture of prepared lime juice and citric acid might not be carried on on a most extensive scale. Lime juice and citric acid are both necessities all over the civilized world.

POMEGRANATE.

(*Punica granatum.*)

The pomegranate is a native of western Asia, but was long cultivated in southern Europe, from whence it was no doubt introduced here by the Franciscans, and grows and fruits almost everywhere. The tree is a beautiful ornamental shrub, bearing a beautiful fruit. The pomegranate is a tree which partakes of the antiquity of the fig, the vine, and the olive, and which, in point of utility, is numbered with the grain-bearing plants, and is used in medicine, and therefore should possess no little interest.

QUINCE.

(*Cydonia vulgaris.*)

The quince is a native of western Asia and southern Europe, and was, no doubt, introduced into the State by the Franciscans, as it is spoken of among the records of the founding of the Missions. It is probably one of the most ancient of fruits, and has always been a popular fruit for home preserving and jelly making. The quince produces abundantly in any part of the State where apples or pears will grow, and the fruit reaches an enormous size.

PISTACHIO.

(*Pistacia vera.*)

The pistachio nut tree grows and bears well in California, and there can be no doubt but that it will be remunerative, especially after the introduction of choice kinds.

TAMARIND.

(*Tamarindus indica.*)

This handsome tree is a native of India, and seems well adapted to several portions of our State. The flowers are small, of a pinkish-white color, followed by pods inclosing a pleasant acid pulp, much used, when preserved in syrup or sugar, as a basis of a cooling drink, and also in medicine, being rich in formic and butyric acids.

CAROB.

(*Ceratonia siliqua.*)

The tree is a very handsome evergreen, with thick, shining, pinnately-compound leaves. The trees are quite widely distributed over the State, and some have borne fruit. The carob pods contain a large quantity of agreeably flavored mucilaginous and saccharine matter, and are used in southern Europe for feeding horses, pigs, etc., and occasionally, in time of scarcity, for human food.

PERSIMMON.

(*Diospyros kaki.*)

This persimmon is a native of Japan, and does exceedingly well in California. The tree is quite hardy, and fruits freely in most every section. The colors of the different varieties range from bright orange-red to light vermilion; the external appearance of some varieties is much like the tomato. The flesh when ripe is soft, and the flavor delicious. The merits of this fruit are well known, and it is fast gaining favor.

PINEAPPLE.

(*Ananassa sativa.*)

The pineapple, although a tropical fruit, grows and bears well in certain localities, but of course its culture is confined to those localities exempt from severe frosts.

WHITE SAPOTA.

(*Casimiroa edulis.*)

This tree is a native of Mexico, and trees are growing in this State nearly one hundred years old. The fruit is of roundish form, about an inch in diameter, with a juicy pulp of a pleasant sub-acid flavor.

BANANA.

(*Musa.*)

The banana is not extensively grown in the State, although it does remarkably well under favorable conditions. The plant is of easy culture, and is more cultivated for its beauty as an ornamental plant.

GUAVA.

(*Psidium.*)

The guava grows and fruits exceedingly well in California, and the jellies made from this fruit are fast coming into favor. Guava jelly is generally acknowledged to surpass all others in richness and flavor, and as it becomes better known there can be no doubt but that it will become established among the food delicacies. The fruit is also eaten fresh, and is preserved and canned.

LOQUAT.

(*Eriobotrya japonica.*)

The loquat is a native of Japan, and thrives exceedingly well in many portions of California. It is a beautiful evergreen, growing to the height of twenty to thirty feet. The fruit ripens from the 1st of February to the 1st of May, and is pale yellow, like a plum, and contains from one to three large pits. It has a peculiarly pleasant acid taste, and is much admired for table use when fresh from the tree, and for converting into jelly. It is the first fruit of the season.

DATE.

(*Phœnix dactylifera.*)

The date palm was introduced into California by the Franciscans, and many date trees are to be seen in various parts of the State over a century old. The date tree grows very luxuriantly, and seems to adapt itself to surrounding conditions, which is shown by its successful growth and fruiting capacity, bearing fine dates every year. New varieties are being introduced, and in future dates will probably become in California an article of no little importance. The date palm is a showy tree, combining as it does the beautiful and the useful in a very high degree.

JUJUBE.

(*Zizyphus jujuba.*)

The jujube is a native of India and China, and is a beautiful shrub, or tree, bearing a red or yellow fruit the size of a cherry, from which is made the delicate paste of the confectioner. The tree grows well, and fruits abundantly every year.

WALNUT.

(*Juglans.*)

The walnut is a native of Persia, and was no doubt introduced by the Franciscans, as many large trees, probably a century old, are yet to be seen at the various Missions throughout the State. The walnut is extensively grown in the State, and is a tree yielding large returns. The first trees planted were from imported seed, and has been designated as the "English" walnut. The southern part of the State seems especially adapted to the growth of this variety of walnut, and the largest and oldest orchards are to be found there, from which large returns have been realized. Of late many new varieties have been introduced, which possess a thinner shell, and seem best adapted for the northern portions of California, and the southern portion as well.

The area of walnut culture is spreading rapidly over portions of the State where it finds a congenial home. From the results already attained this industry is growing in favor.

PECAN.

(*Carya oliviformis.*)

The pecan nut does remarkably well in the State, although it has not been cultivated extensively. This tree requires a deep, rich soil and a warm exposure to secure its best development.

PEANUT.

(*Arachis hypogæa.*)

The peanut is extensively grown in California, and the product is becoming very popular. Extensive plantations have been made in different portions of the State, where the soil is rich sandy loam, and from which have been derived handsome returns.

CHESTNUT.

(*Castania vesca.*)

Native of Asia Minor; does remarkably well throughout the State, and grows and fruits wherever the walnut is grown. The sorts most largely planted are the Italian and Japanese. These nuts reach a remarkable size, and are of fine quality.

HAZELNUTS—FILBERTS.

(*Corybus.*)

Hazelnuts and filberts have not given very satisfactory returns, yet they thrive and do well in most any part of the State. Grafts inserted into the wild hazelnut have produced better results, and might not the experiment be pursued further? The wild hazelnut is indigenous to the northern portion of the State, and can be found from the valley lands to the mountain tops. It is very productive and hardy, rarely, if ever, failing to produce a good crop annually.

ALMOND.

(*Amygdalus communis.*)

The almond tree is a native of Africa and Asia, and thrives wonderfully well in California. The almond has been sufficiently remunerative to induce its planting largely, and the area is rapidly increasing. The tree does well on land suitable for the peach; it is a good bearer, and gives good returns. The Languedoc, a French variety, was formerly grown, but proved itself to be a shy bearer and unprofitable. Extensive experiments were carried on for several years, until new varieties were originated in California that are reliable and which yield certain crops, are very prolific, and the fruit of which has no equal.

RASPBERRY.

(*Rubus.*)

The raspberry is a low, deciduous shrub, and bears abundantly throughout the State. The large-fruited varieties were introduced from most European countries, including Great Britain. Besides these, we have in the woods throughout the State the common black raspberry, or thimbleberry, and the red raspberry, which bear very good fruit.

The raspberry is a deciduous shrub with a creeping, perennial rootstock, and a biennial stem. The fruit is extensively employed for cooking and preserving in various ways; it is also used for dessert, and largely used in the manufacture of raspberry brandy, wine, vinegar, etc.

BLACKBERRY.

(*Rubus fruticosus.*)

The blackberry is a hardy deciduous shrub, and succeeds in all parts of the State. It is a favorite fruit in the markets, and, like the raspberry, is used for cooking and preserving in various ways, and for dessert and the manufacture of blackberry brandy, etc.

CURRANT.

(*Ribes.*)

The currant is a native of Great Britain and the north of Europe, and is an exceedingly hardy fruit-bearing shrub. It does remarkably well in California near the coast, and seems to require cool and moist air to bring its fruit to perfection. Currants are also grown quite largely along the rivers and in moist soils along the foothills. There are several varieties grown. The currant is largely used for dessert, tarts, and for jelly and jam.

GOOSEBERRY.

(*Ribes grossularia.*)

The gooseberry is a hardy deciduous shrub, a native of various parts of Europe, including Great Britain. It thrives well in this State along the coast counties and along the rivers and foothills. It seems to require a cool climate to do well. The fruit is very popular, and is valuable in a green or ripe state for cooking, bottling, or preserving.

STRAWBERRY.

(*Fragaria.*)

The strawberry is a native of the temperate latitudes of both hemispheres, of Europe, Asia, North and South America. This berry is the most delicious and the most wholesome of all berries, and the most extensively cultivated; in fact, it is doubtful if there can be an orchard anywhere in the State that has not a patch of strawberries from which the home table is supplied. The fruit is universally favored, and is always held in high esteem. The fruits are used, as it is well known, when ripe, in various ways, principally for dessert, but also for cooking and preserving.

MULBERRY.

(*Morus.*)

The mulberry is a hardy deciduous tree, and thrives well throughout the State. The first mulberry trees introduced were for the purpose of feeding silkworms. In recent years most of the European and Asiatic fruiting sorts have been introduced, and all do remarkably well. The berries of most of these sorts attain a remarkable size, and are of excellent flavor.

CRANBERRY.

(*Oxycoccus macrocarpus.*)

The cranberry is a trailing shrub—a native of Europe, North Asia, and North America. It is a plant that grows on swampy land. So far only limited experiments have been tried in its culture along the rivers, on bottom lands which the water covers for a few inches. The experiments have so far not proved commercially successful, but the fruit produced in the State has been pronounced good. More extended experiments will have to be made before we can arrive at any definite conclusions.

CHERIMOYER, OR CUSTARD APPLE.

(*Anona cherimolia.*)

The cherimoyer is a native of Peru, and does remarkably well in this State, especially in the southern part, but requires sheltered situations. It is a handsome tree, and the fruit is quite odd, but sweet and pleasant to the taste.

ALLIGATOR PEAR.

(*Persea gratissima.*)

This tree is a native of Mexico, and does exceedingly well in this State. The tree seems to be suited to the different conditions, but gives better results in sheltered localities.

GRANADILLA.

(*Passiflora edulis.*)

The granadilla is a species of passion vine, bearing edible fruits, and is very ornamental.

MEDLAR.

(*Mesphilus germanicus.*)

The medlar grows and does well in most all parts of the State, but the tree is planted more for ornament than for its fruit.

MELON SHRUB.

(*Solanum muricatum*, syn. *guatemalense.*)

A small shrub, a native of Guatemala, bearing a yellow fruit, splashed with violet, with a strong melon taste. The plant is very easily propagated, and does well where there are no harsh frosts.

CHAYOTA, OR CHŒHO.

(*Sechium edule.*)

This plant, whose native country is unknown, was introduced from the south of Europe and Africa. The plant bears an edible fruit, which is considered wholesome, and thrives well in different portions of the State. The root grows to an enormous size, somewhat resembling a yam, and is valuable as food for stock. The fruit resembles the vegetable marrow.

TOMATO.

(*Lycopersicum esculentum.*)

Native of South America. The tomato is extensively grown throughout the State. The plant thrives almost everywhere, but requires a rich soil to give best returns. California canned tomatoes are now known the world over, and the industry is one of no little importance. The pack now aggregates over 300,000 cases yearly.

CAPE GOOSEBERRY.

(*Physalis edulis.*)

This plant is a native of Peru. It grows and fruits most everywhere where the tomato thrives. The fruit is used in cookery, and for preserves.

BAMBOO CANE.

(*Bambusa.*)

Bamboo is native of Asia. It grows very well in most parts of the State, in moist soils, or where irrigation is practiced. The plant is very ornamental, and the cane is valuable for hedges and other purposes. The plant grows to a great height.

TUNA.

(*Opuntia.*)

This plant was used in the early days for hedges, and many are yet to be seen around the Missions. The fruit has a delicious flavor. It is used by some people for jellies, to which purpose it is well adapted. In the early times it met with great favor.

SPANISH BAYONET.

(*Yucca.*)

There are three species of this plant indigenous to California. It is grown on the plains—in the deserts extending into Arizona. This plant has a commercial value in its fiber, from which cordage and paper are made.

PAMPAS GRASS.

(*Gynerium argenteum.*)

This highly ornamental grass is a native of South America. Careful selection of seedlings and cultivation has produced varieties that are remarkable for their size and rich cream tint of the plumes, altogether different from the original stock. A very large acreage is planted in this State, and the plumes are shipped largely to the Eastern States and Europe.

NEW ZEALAND FLAX.

(*Phormium tenax.*)

Native of New Zealand. This plant thrives luxuriantly in all parts of the State. The leaves are sword-shaped, and from the fiber of which strong cordage can be manufactured.

COTTON.

(*Gossypium.*)

This fiber plant grows and does remarkably well in California, especially where irrigation is practiced. Extensive plantations have been made in different localities, and the quality of the fiber has been pronounced superior to that of the Southern States.

FLAX.

(*Linum usitatissimum.*)

This fiber plant is cultivated extensively throughout the State for seed, and does remarkably well, yielding good returns as a paying crop.

HEMP.

(*Cannabis sativa.*)

Hemp is a native of North India and Persia. It is an annual plant, growing to a height of six to eight feet, but in rich soils attains a much greater height. Experiments have been made in the culture of this plant in many portions of the State, and it does quite well, but more experiments are required to test its commercial value.

JUTE.

(*Corchorus capsulari.*)

This fiber plant is a native of Asia and India. Experiments have been made in the cultivation of this plant in many portions of the State. It grows well, but so far has not attained the height it does in Calcutta. It does best on marshy lands.

RAMIE.

(*Boehmeria nivea.*)

Extensive experiments have been made in the culture of this important plant, and has proved itself well adapted to this State. It is a native of the East Indian Archipelago. From ramie a fiber is extracted which, upon proper management, can be put to almost unlimited uses for manufacturing purposes.

HOP PLANT.

(*Humulus lupulus.*)

This diœcious perennial plant is indigenous in temperate Europe and North America. It thrives wonderfully well in this State, and is especially adapted for the low or moist lands. The culture of the hop is carried on very extensively, and from which handsome returns are netted to the growers.

ALFALFA.

(*Medicago sativa.*)

A native of the Mediterranean region. This plant is undoubtedly the most valuable forage plant in the world. It is the best of all forage plants for a drought, its roots penetrating the soil to a great depth. It has proved a priceless boon upon the naturally moist or irrigated lands of the State.

GINGER.

(*Zingiber officinale.*)

The root of this plant consists of a jointed root, or rhizome, which throws up numerous reed-like stems about two feet and a half in height, with long, narrow, lanceolate leaves. The plant grows and does very well in most parts of the State.

MUSTARD.

(*Sinapis nigra.*)

Mustard is extensively grown in California. Numerous species are cultivated, and especially this variety, which yields the most pungent mustard, and is therefore mostly used by the manufacturers of that condiment.

CASTOR-OIL PLANT.

(*Recinus communis.*)

This plant has been grown in different parts of California for many years. It is a tender plant, easily destroyed by frosts. It makes strong growth, and produces seed the same year, from which castor oil is made.

TOBACCO.

(*Nicotiana tabaccum.*)

The tobacco plant has been extensively grown in this State, and thrives well almost everywhere. Extensive plantings have been made, from which have been derived good paying returns.

PYRETHRUM.

(*Pyrethrum cineraræfolium.*)

This plant, a native of Dalmatia, is extensively grown in California. The product made from it is used as an insecticide, and is especially used against household pests, for which purpose it has no equal. It is found in the market under different brands. The plant thrives and does well in most portions of the State.

OPIUM POPPY.

(*Papaver somniferum.*)

Native of Asia. This plant thrives wonderfully well in most parts of the State, but as yet has only been grown for ornament. It is from this plant that opium, a drug, is manufactured.

BLACK WATTLE.

(*Acacia decurrens.*)

This valuable tree is a native of Australia, and thrives wonderfully well in California. The tree is of very rapid growth, and has a commercial value in its bark, which is used for tanning purposes.

CORK OAK.

(*Quercus suber.*)

The cork tree (or cork oak) is a native of the south of Europe, and has been grown in this State for several years. It thrives and does remarkably well. There have been exhibited at different fairs sections of bark from which cork is manufactured, of two to four inches thick, and the cork has been pronounced of superior quality.

SUGAR CANE.

(*Saccharum officinarum.*)

This is the sugar cane of commerce, and is a native of the East Indies. The plant thrives exceedingly well in most portions of the State, especially along the rivers and in irrigated sections. The quality of the cane has been pronounced excellent, and especially the higher percentage of saccharine which it has developed.

SUGAR BEET.

(*Beta.*)

The culture of the sugar beet is no longer an experiment; large plantations are to be seen in Santa Cruz, Alameda, and San Bernardino Counties. Sugar from sugar beets is now manufactured in the State extensively, and the industry has become of great importance. Three large establishments have been built to process the beets that are grown;

in fact, California is to-day the largest producer of beet sugar of any State in the Union.

MISCELLANEOUS PLANTS.

The following commercial plants have been planted in different parts of the State, as an experiment and for ornament. While some of them are not profitable to grow, yet it proves their adaptability to our soil and climate:

Fennel (*fœniculum vulgare*).—Native of the warm-temperate parts of Europe and Asia. It is a perennial plant, with pinnate leaves.

Camphor (*camphora officinalis*).—Native of China and Japan; makes fine growth.

Broom Corn (*sorghum dura*).—Native of India; does well and is largely grown.

Indian Millet (*sorghum vulgaris*).—Native of the West Indies; does remarkably well and is largely grown.

Sunflower (*helianthus annuus*).—Native of Mexico; thrives exceedingly well and is largely grown. The seed is used to feed poultry, and can be used for the manufacture of oil.

Rape, or Colza (*brassica napus-campestris*).—Native of India; quite hardy.

Fenugreek (*trigonella fœnumgræcum*).—Native of India.

Licorice (*glycyrrhiza glabra*).—Native of south of Europe, Hungary, and China. This plant thrives well in different portions of the State. It is a herbaceous perennial plant, with long roots, pinnate leaves, and small bluish flowers. Licorice roots have been exhibited at different fairs, and have been pronounced of superior quality.

Nutmeg (*myristica fragrans*).—Native of Sumatra and Madagascar.

Coffee (*coffea arabica*).—The coffee plant is a native of the Abyssinian Mountains, from whence it was introduced into Arabia, Java, and the West Indies. The plant grows and thrives very well in a few frostless portions of this State, in sheltered situations. Experiments in its propagation are now being made on a larger scale, especially in the southern portion of the State, which has been pronounced by experts as possessing the requisite conditions and climate suitable for its culture.

Tea (*thea sinensis*).—The tea plant is a native of China, and is a shrub growing to a height of five to six feet, with leaves about three inches in length. Tea is a very hardy plant, capable of enduring great differences of temperature. It has been planted in California only as an experiment and for ornament. The plant does well in most parts of the State, and will grow on most any soil. The plant is very ornamental.

Rice (*oryza sativa*).—This important grain is a native of eastern Asia, and was cultivated in China 2,800 years B. C. It is the staple food of one third of the inhabitants of the world. Experiments in rice culture have been tried, along the rivers and marshy lands, with somewhat satisfactory results. The plant is very hardy.

CHAPTER VII.

THE WILD FRUITS OF CALIFORNIA.

[This chapter has been especially prepared for this report at my request by Prof. E. J. Wickson, of the University of California. Prof. Wickson is the author of a practical treatise entitled "California Fruits, and How to Grow Them," which is a valuable guide to beginners in fruit culture in this State, and describes the most successful local practices.—B. M. Lelong, Secretary.]

The wild fruits of California are numerous, and for the most part peculiar to the region, being either of local genera or local species of more widely distributed genera. Very few are identical with the wild fruits common to great areas of the continent. For this reason our wild fruits constitute a very interesting subject for botanical study, and they are now, perhaps more widely than ever before, attracting the attention of botanical pomologists. Viewed from the standpoint of practical pomology or horticulture, our wild fruits cannot be claimed, on the whole, to have attained any very great importance.

A few fruits, as will be noted further on, have demonstrated their culinary or household value, and are locally sought for, but none have any notable commercial value. This may be due to the fact that some of our most delicious wild fruits are very exacting in their choice of conditions, and cannot be moved far, even within the limits of our own State, and presumably would not take kindly to longer journeys.

Another reason why we have made little of our own wild species is found in the fact that our climate favors the superior growth of the best improved fruits of nearly all parts of the world. Therefore, we have little occasion for recourse to the improvement of local wild fruits, because of superior hardiness and adaptation, as has been done in other parts of the country. Neither fruit planters nor propagators have given any special attention to the wild growths, either for fruit or for stocks, although a beginning has been made in both these directions, which may ultimately attain importance. For this reason our notes upon California wild fruits will be a combination of botanical allusions and utility records, with only an occasional reference to cultivation. The horticulture of California wild fruits is a thing of the future.

The distribution of our wild fruits is determined by limitations of areas of similar climatic conditions. These are well outlined in other parts of this volume. In a general way it may be said that fruits are most abundant in foothill and mountain regions, and that our great valleys have always been practically destitute of them, except along stream borders. These fruits are most abundant in the northern portion of the State, but some exist throughout the State, usually thriving at higher elevations as they proceed southward.

OREGON CRABAPPLE.

(*Malus rivularis.*)

This fruit, though more abundant in the more northerly regions of the coast, as its name indicates, is found in the northwest counties of this State. It chooses a moist situation, becomes a tree 15 to 25 feet high, shows white bloom, and red or yellow oblong fruit, about half an inch long. The flavor is rather acid, but the fruit is eaten by the Indians, and was sometimes used for jelly-making by early settlers.

WILD PLUM.

(*Prunus subcordata.*)

This must be regarded as one of the most useful of our wild fruits. Even now, when the plum varieties of all the world have been introduced, residents in some of the Sierra regions, where an excellent variety (*Kelloggii*) abounds, prefer it to the cultivated fruit, both for eating and preserving.

The typical species is widely distributed over the mountainous regions of the State, and is a low shrub with white bloom and fruit three quarters of an inch long, of red color and inferior pulp. The better variety has a narrower range, forms a larger shrub, and bears a yellow fruit, larger and better than the typical species. Some attempts have been made to improve this variety by cultivation and selection of seedlings, and the results are promising, as fruit has been shown at our fairs notably better than the wild gatherings. The roots have also been used to some extent as stocks, but seem to possess no marked advantage. Mr. Felix Gillet, of Nevada City, reports that grafting an improved plum on the wild stock seems to cause the root to grow to much greater size than natural to it. Observation upon grafted and non-grafted seedlings in the same nursery row convinced him of this behavior. Other experimenters have condemned the stock because of dwarfing and suckering.

In early days the wild plums in the mining regions of the mountains were largely made use of and are highly praised by pioneers.

OSO BERRY.

(*Nuttallia cerasiformis.*)

This fruit is sometimes called the "California false plum." It has a plum-like form, and is of a rich, blue-black color, but is bitter, though not disagreeable to birds and animals, which feed upon it. The white bloom of the shrub has an almond odor. Used as a stock, the plum varieties grafted upon it have been dwarfed.

WILD CHERRIES.

(*Cerasus* s[illegible])

Quite a group of wild fruits come under this generic grouping, and they have marked and widely different characteristics. One (*Cerasus demissa*) closely resembles the Eastern chokecherry, and bears its round, red, or dark purple fruit on a raceme. This species has proved of some utility both for its fruit and as a stock for grafting in early days when better cherry stock was not available. Another species (*Cerasus ilicifolia*) has evergreen foliage, and is a useful hedge plant.

Of species bearing fruit in umbels, or true cherry style, we have two. *Cerasus emarginata* makes a handsome tree, sometimes 30 feet high, but its oval, dark red fruit is quite bitter and astringent. The other species (*Cerasus Californica*) bears bright red fruit intensely bitter.

CALIFORNIA GRAPE.

(*Vitis Californica.*)

Along our streams the native grapevine attains large size and fruits freely, the fruit resembling the "frost grape" of the East. The vine frequently covers and sometimes kills large trees with the density of its foliage. Some variation is reported in the species, but it is possible that some of the better kinds are seedlings from some imported species, bird planted. The species has attained something of a reputation as a phylloxera-resisting root for grafting, but it has proved exacting in its choice of soils and situations, and otherwise not desirable, and some Eastern species are now relied upon for this service.

ELDERBERRY.

(*Sambucus glauca.*)

The elderberry makes a fine tree in California, sometimes 20 feet or more in height, and with a trunk a foot and a half in diameter. The fruit is borne in large quantities and is used to some extent.

RASPBERRIES.

(*Rubus* sp.)

In the mountains of the eastern part of the State is a scarlet hemispherical berry of pleasant flavor which is called "thimble berry" (*Rubus parviflorus*). It seems to have an advantage over a variety (*velutinus*) of the same species which is found near the coast and has a dry, insipid fruit. Another raspberry, which is found in all hilly and mountainous regions, both on the coast and in the interior, is *Rubus leucodermis.* It resembles the black cap raspberry of the Atlantic slope, except that it has yellowish-red fruit. This fruit is quite largely gathered for domestic uses, and some efforts have been made to cultivate the plants.

SALMON BERRY.

(*Rubus spectabilis.*)

The beauty, size, and delicious flavor of this fruit are highly commended by all who have enjoyed it in the upper coast counties of California and farther northward. The plant makes a strong bush, five to ten feet high, and it delights in woods and shady banks of streams. The praise of all who know the fruit has led to frequent attempts to introduce the plant to warmer and drier parts of the State, but such efforts have thus far uniformly failed.

WILD BLACKBERRY.

(*Rubus vitifolius.*)

This fruit should perhaps be called a "dew berry," as it has trailing, or, at most, but partially raised stems, which extend from five to twenty feet. The plant occurs abundantly on banks of streams and other sufficiently moist locations both in the coast and interior regions of the State, and the fruit has been held in high repute ever since pioneer days. In some parts the crop is considerable, and is turned to some commercial account. The fruit is oblong, black, and sweet. The species is variable, and the anomaly, a *white* blackberry, has been reported from Del Norte County.

WILD STRAWBERRIES.

(*Fragaria* sp.)

We have in California two Eastern species: *Fragaria vesca* and *F. Virginiana.* Thus far these have only been reported from localities in the Sierra mountain region. Another has been found identical with a

South American species, *Chilensis*, and it occurs along the coast, where the fruit is esteemed, and is sometimes abundant enough to gather in quantity. A fourth species is local, and is named *Californica*. It bears a small round fruit and is partial to the coast region. Recently some cultural attention has been given to the wild strawberry, and a variety worthy of propagation is reported by two growers resident in the Sierra region.

WILD GOOSEBERRIES AND CURRANTS.

(*Ribes* sp.)

Some of our currant species are achieving quite a reputation abroad as ornamental shrubs, but they bear insipid fruit. The fruit of *Ribes tenuiflorum* is, however, more agreeable, and is esteemed by dwellers in its region, which is the mountain region of the extreme north of the State. We also have a species (*bracteosum*) which has something of the black currant flavor and a fair-sized fruit.

There are also several species of *Ribes* which are classed with the gooseberries, but only three bear edible fruit. One of these (*Ribes divaricatum*) is peculiar to this coast; another (*Ribes oxyacanthoides*) occurs at an elevation in the Sierra Nevada and thence extends eastward beyond the Rocky Mountains. The berries are small to medium, of pleasant flavor, and well armed with spines. Another species (*Ribes quercetorum*) is common in San Luis Obispo and Kern Counties, resembles the flavor of the cultivated gooseberry, and is free from spines.

CRANBERRIES.

(*Vaccinium* sp.)

We have several species belonging to the same botanical genus as the Eastern cranberry, but quite different from it both in growth of plant and character of fruit. The fruit of two species is reddish, but insipid. Other species have dark blue or purple fruit. Some of these are locally esteemed, and the argument drawn from them is that the cranberry of commerce would succeed. It should be stated, however, that the situations in which these plants thrive are not at all according to the requirements of the bog cranberry.

OTHER BERRIES.

There are many small, wild fruits which are commonly designated as berries, which are of considerable botanical interest. The fruit, too, may be said to be edible, judging by the taste of Indians, birds, and wild beasts, but which are not likely to be much more than ornamental in the eyes of white people. They may be briefly enumerated:

The "manzanita" (*Arctostaphylos manzanita*), the "little apple" of the Spaniard, bears a rather dry but sub-acid fruit.

The "bear berry" (*Arctostaphylos uvaursi*) is esteemed by Indians both as food and medicine.

The "salal" (two species of *Gaultheria*), small fruit, either red or purple, is also a favorite of the aborigines.

Of "barberries" we have three species of *berberis*. One, *aquifolium*, is called the "false Oregon grape," chiefly notable for its handsome bloom, which has been chosen the State flower of Oregon. Another species (*nervosa*) has a larger fruit, which is esteemed in cookery; and a third species (*pinnata*) bears a small, pleasant-flavored fruit.

Our "service berry" (*Amelanchier alnifolia*) is from a quarter to a third of an inch in diameter and of a purple color.

The "lemon berry" is a fruit of *Rhus integrifolia*, and is coated with an acid exudation which is said to dissolve in water and make a pleasant drink. The fruit of *Rhus lobata* is said to have both a sweet and an acid coating.

The berries of the "toyon" or "tollon" (*Heteromeles arbutifolia*), or "California holly," are said to be eaten by Indians, but they serve the white people a better purpose in Christmas decorations.

The "jujube" of commerce (*Zizyphus jujuba*) has a local relative in *Zizyphus parryi*, which is, however, dry and mealy, rather than juicy.

WILD NUTS OF CALIFORNIA.

The wild nuts of California are of very little commercial importance. The wild almond (*Amygdalus Andersonii*) of the eastern slope of the Sierra Nevada is only of botanical interest, and little more can be said of the California filbert (*Corylus rostrata*), which has none of the quality of the improved filberts nor even of the wild hazelnut. Our chestnut (*Castanopsis chrysophylla*) has a sweet kernel, but a hard shell, almost like a hazelnut. Our native walnut (*Juglans Californica*) is better in flavor than the Eastern black walnut, but its hard shell makes it of little commercial account in competition with better cultivated nuts.

The one native nut which is regularly sold in the local market is the "pinenut"—seeds of several species of Pacific Coast pines. Their flavor is somewhat resinous, but is agreeable.

The seeds of two species of palms, *Washingtonia filifera* and the Lower California *Erythea armata*, are sought for by the Indians, who also eat the sweetish fruit of the *Yucca baccata*, which somewhat resembles in shape the banana, and in flavor the fig.

The Indians also use the acorns of several species of California oaks as food, extracting the bitterness by soaking in water and then making a rude bread of the acorn meal.

CHAPTER VIII.

A DESCRIPTION OF THE COUNTIES OF THE STATE.

ALAMEDA COUNTY.

Alameda County fronts the bay of San Francisco, and lies opposite to San Francisco and the Golden Gate. It is bounded on the north by Contra Costa County, on the east by San Joaquin County, south by Santa Clara County, and west along its entire length by the bay of San Francisco. Its area is 737 square miles, or 512,000 acres. For a distance of 36 miles, Alameda County fronts upon the bay, with an average width of 25 miles, extending to and beyond the summit of the Contra Costa Hills, comprising numerous beautiful valleys, besides the broad Alameda Valley, which last is bounded by the waters of the bay on the one side and the Contra Costa Hills on the other, and is one of the richest and most fertile valleys in the State. Among the most important of the smaller valleys are Livermore, Sunol, Castro, Amador, and Moraga, all richly endowed by nature with most productive soils, where flourish the grape, olive, fig, orange, and most of the semi-tropical fruits, and beautified with perennial flowers. The Contra Costa Hills, themselves, are well adapted to the cultivation of the olive, and the time is not far distant when the whole range of hills will be covered with the beautiful trees.

The principal stream in this county, Alameda Creek, rises in the Mount Diablo range, near Livermore Pass, and running through a cañon in the Contra Costa range, empties into San Francisco Bay, supplying water power for several mills on the way. It is also navigable for schooners and light-draught crafts for several miles. There are several other creeks crossing the county and emptying into the bay, two of which furnish water for the city of Oakland. By the construction of a high dam at a narrow gorge in the hills, San Leandro Creek is made to form Lake Chabot, half a mile in width by 2 miles in length, and 280 feet in its deepest part.

The range of hills, as has been stated, extending the whole length of the bay-front of the county, at a distance from the bay ranging from 5 to 10 miles, reach their highest altitude at Mission San José, at the southern end of the county, in Mission Peak, the highest point being 2,275 feet above tide-water. In early days these hills were covered with giant redwood trees; some of the old stumps remaining measure from 6 to 10 feet in diameter. The timber was cut away by the early pioneers, the lumber being used to build up San Francisco in the palmy days of '49 and '50, until scarcely a redwood is found of any dimensions.

The country around Haywards was once a great grain-growing region, but its special adaptability for fine fruits is causing large tracts to be set out in orchards. Even now this district is one of the great fruit-raising regions, many millions of pounds being annually shipped.

The soils of this county that are immediately along the bay in Alameda Valley and the marshes formed by the overflow, are heavy, but very fertile when reclaimed. Then comes a broad belt of rich, black adobe. This belt is crossed by sedimentary deposits of alluvial land made by shifting channels of streams running down from the Coast Range. In the Niles region are lighter loams. About Livermore are uplands, bench, and valley lands. Between the latter two classes the difference in potash, lime, and phosphoric acid accounts for difference in grape crop.

Mission San José is characterized by gravelly, upland, adobe soil, and was evidently chosen by the padres of the old Mission for its exemption from frost, caused by its slight elevation above the surrounding valleys.

At Pleasanton the section tributary consists of agricultural and grazing lands. The soil is very rich sediment bottom, producing hay, grain, potatoes, hops, and beets in abundance.

At Alvarado the surrounding country is a fine farming and fruit region, and gardening and dairying are also largely carried on. The fertile, alluvial soil of the country about is finely adapted to fruit growing.

The climate of Alameda County is unsurpassed for equability and salubrity, never reaching the extremes of heat or cold, the nights being always cool. Bordering on the bay, it is subject to frequent fogs during the spring months, but these are not usually dense or of long duration. It is sheltered from the chilly winds of the ocean by the peninsula of

San Francisco and the intervening bay. In the interior the climate is unlike that of the coast, being hotter and drier. This is true especially of Livermore Valley. The highest temperature here in 1891 was but little over 100°, and the rainfall for that year was 17.05 inches.

Alameda County ranks as one of the leading fruit counties in the State. It was one of the earliest to be devoted to the production of deciduous fruits upon a large scale, and the success which has attended all the experiments made here has done more than anything else to encourage the development of this pursuit in other parts of the State. The orchards, which extend all the way from Oakland to the boundary of Santa Clara County, occupying the wide belt of alluvial soil between the bay shore and the hills, and even covering those hills and extending into the valleys beyond, can hardly be excelled in productiveness by any equal area in the world. Every kind of fruit and vine flourish in this county. Cherries, currants, and gooseberries are shipped to other parts of the State. In the production of cherries, Alameda stands at the head. More cherries are shipped to Eastern markets from this county than from all other parts of the State. Although fruit growing long since became a favorite industry in this section, the grain farmer still maintains his hold.

In a sketch of the horticultural growth of Livermore Valley, W. P. Bartlett speaks as follows:

"A few family orchards were planted from time to time, and conscientiously neglected all the time; and it is within the past ten years that an orchard of more than an acre or two could be found in Murray Township. We have to-day upward of 1,500 acres of commercial orchard, all young, cared for properly, and protected from disease and the assaults of insects.

"These plantings have mostly been made with a clear discernment of the needs of the various fruits in the matter of soil and climate, and it is therefore probable that the proportion of failures will be less than is usual in inaugurating an industry in a new country. I once heard a prominent orange grower at Riverside, who began when land could be bought for little or nothing, say, that he had better have paid $1,000 an acre and had it with the experience he had gained in planting wrong varieties.

"But, fortunately, there was, for the keen men who were our first orchard planters for profit, an infallible guide to success. At this day it may seem strange to so state in view of the poor, broken-down, forlorn-looking, neglected orchards of the wheat farmer, pointed at by every one as proof that fruit growing was a failure in this valley. Remnants of these orchards still exist in favored localities; where fairly well cultivated, entire plantings exist and bear fruit. But generally only a few trees remain. And these are what? The pear, the almond, and the apricot. The rest are either dead or merely dragging out a miserable existence. Apple, peach, plum, prune, cherry, all have succumbed to neglect and bad management, only these, then, being left to tell the tale. The almond and pear produce considerable fruit. The apricot misses pruning and is sulky, but makes a large tree nevertheless. There is a small orchard near the Martin ranch, 7 miles north of Livermore, where the trees are but 19 feet apart, have never been pruned or cultivated for twelve years, and are open to the incursions of stock. Yet the pear trees bear heavily every year. I have seen barrels of fruit on a single tree.

"With good cultivation, on rich soil, the pear flourishes here, delighting in our dry air, which represses the slug and prevents mildew, that enemy of the sets in moist climes. The fruit, too, is large and firm, and will stand shipment, while that grown in fogs will not.

"The almond has been largely planted here, and is essentially a dry-air tree. It is later in coming into bearing here than in some other localities, but is a heavy producer when it does begin bearing. Mr. Hatch's El Primo orchard, planted in 1886, bears its first fine crop this season, though the trees are of large size. No insect enemies have appeared.

"The apricot bears young, makes a fine, large tree, stands erect against the wind, and unless its tendency to overbear is strongly checked by either spartan pruning or heroic thinning, the fruit is apt to be small.

"The peach does well here in protected spots, on naturally sub-irrigated land.

"The olive thrives, and after the third year makes a vigorous growth, bearing in the sixth. Its productiveness is something marvelous. All the Rock importations, and several others, have fruited here. All bear regularly, and nearly all are extremely prolific. The tree has no enemy here but the twig borer, which does little harm.

"The White Adriatic fig makes a good growth here, but the first crop is small, and the second is mostly cut off by the frost. Experiments in cultivation and treatment may cure the defect. It has no enemy but the gopher.

"The prune is not a success, excepting, perhaps, on the moist loam land about Pleasanton. In our best orchard, the fruit runs 100 to 110 to the pound—entirely too small. This tree requires fogs. In the Santa Cruz Mountains it branches out like an apricot; here it runs up like a cherry. This close habit allows the sun to scald the bark, and the tree is gone.

"The cherry, except in a few dry spots, is practically a failure for the same reasons.

"The apple tree planted here often brought the woolly aphis from the nursery; and as if that were not enough, our dry air and soil do not agree with the tree.

"Insect enemies are not numerous, and do not give such trouble to the fruit grower as about San Francisco Bay.

"The pernicious scale has often been introduced here, but has made no headway, being, I believe, killed by our dry north winds. I have witnessed three instances of the destruction of the scale in this way, and believe that whenever it is exposed to the direct effects of this wind it is destroyed. What this means to the orchardist can only be appreciated by those who have fought this pest.

"The apricot and pear do best on our heavier and richer loams, and light alluvial and loose gravelly loams. The olive thrives best on deep, well-drained, rich vegetable loams, and not on shallow soils and rocks, as is often stated.

"In fruit, as in all else, we attain quality rather than size, though culture, close pruning, and thinning will give us this quality as well."

Very little irrigation is done in Alameda County, and but one canal of any extent is found here. This is owned by the Murray and Washington Water Ditch Company, is 5 miles in length, and is assessed at $1,100.

About Newark and Alvarado there is a very large substratum of artesian water, and some fifty wells are now in active operation. These vary in depth from 200 to 400 feet, and cost for clear work $1 50 per foot for sinking. There is a plan now on foot to supply Oakland with water from these wells by means of large pumps and a reservoir.

Alameda is a very large producer of cherries, apricots, peaches, plums, pears, prunes, and berries, a large part of which find a market in San Francisco, Oakland, San José, and Sacramento, but the greater part is shipped to Chicago and the East. The greater portion is shipped green. This is packed in 25 and 60-pound boxes. Much of the second-grade fruit is shipped to the canneries in San Francisco, Oakland, and San José. The output of fruit from Alameda County for 1891 is estimated at 1,000,000 pounds.

For the present season a shortage in nearly all classes of fruit is reported, but the increased prices received have more than compensated for the shortage.

ACREAGE AND VARIETY OF FRUITS IN ALAMEDA COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	435	70	505	12
Apricot	2,630	680	3,310	230
Cherry	1,743	428	2,171	87
Fig	21	3	24	2
Olive	32	5	37	3
Peach	963	412	1,375	157
Nectarine	176	231	407	78
Prune	1,860	491	2,351	182
Pear	1,384	317	1,701	120
Plum	1,664	221	1,885	76
Quince	3	1	4	--------
Persimmon	1	--------	1	--------
Lemon	1	--------	1	--------
Orange	7	5	12	1
Nuts—Almond	1,012	225	1,237	67
Walnut	28	8	36	2
Chestnut	3	1	4	--------
Small fruits	1,087	256	1,343	256
Totals	13,050	3,354	16,404	1,273

The principal fruit section of Alameda is found near Alameda Creek, the belt extending about a mile on each side of the creek. The soil here is a rich, black loam, with little sand, and is well adapted to the growth of peaches, apricots, cherries, plums, and pears. Centerville, Niles, Haywards, San Lorenzo, San Leandro, Mission San José, and Irvington, are all centers of important fruit regions.

ALPINE COUNTY.

Alpine County is one of the mountain counties of California, and its principal industries are mining and lumbering. It has but a small population, the last census giving it at 667. Its geographical boundaries are, north the State of Nevada, east Mono, south Tuolumne, and west El Dorado, Amador, and Calaveras Counties. Its area is 882 square miles, or 535,000 acres. Its cultivated lands will not reach 1,000 acres.

The county is a succession of mountain ranges, with high and precipitous peaks, interspersed with numerous lakes, rivers, creeks, and beautiful valleys. Silver Mountain is the highest peak in the county, having an altitude of 10,000 feet. The town of Silver Mountain is situated at or near the base of this mountain. Round Top is another one of Alpine's towering peaks; it is 10,600 feet high. There are numerous small lakes throughout the county, the waters of which are clear and cold. Many of them contain the mountain trout. Of these are Blue Lakes and Caples Lakes, in the eastern part of the county. The county is bountifully supplied with brooks, creeks, rivulets, and rivers, many of them heading up in the mountains, fed by the numerous lakes and the melting snow, which keeps them running through the summer season. The Carson River heads in the southern part of the county, and flows from south to north through the county. It is fed by numerous streams, viz.: the East Fork of Carson River, the West Fork of Carson River, and Wool, Silver, Monitor, Smith, Mogul, and Indian Creeks.

Among the mountains are numerous valleys. The largest and most noted are: Diamond, Hermit, Pleasant, Hope, Faith, and Charity. Diamond Valley lies in the northeastern part of the county, and contains some very rich, productive ranches, producing wheat, barley, hay, oats, and potatoes. The three sister valleys of the county—Faith, Hope, and Charity—are located in the northwestern part of the county, at an altitude of 7,500 feet above sea-level. These valleys are inhabited only during the summer months, and then by stock raisers and dairymen. The dairy interest in these three valleys is of considerable importance, and more than 30,000 pounds of butter of an excellent quality are produced annually. Pleasant Valley is near the town of Markleeville, where considerable hay is cut and marketed to the residents thereabouts. There are many other small valleys throughout different parts of the county, where sheep and cattle are grazed during the summer season. The nutritious bunch grass, which grows so luxuriantly in those mountainous regions, is of an excellent quality, and stock fattens very rapidly upon it.

The entire western section of the county is a wild, mountainous region, whose grandeur of scenery vies with the Alpine regions of Europe. From November till late in June the region is wrapped in a mantle of snow, varying in depth from two to fifty feet; during the remainder of the year it forms a vast mountain pasture for thousands of sheep and cattle that are driven there from the lowlands of the State to feed during summer and fall. The greater part of the surface of this mountainous region, as well as of the lower and eastern section of the county, is covered with forests of heavy and valuable timber. All the coniferous trees common to the western slope grow to a large size on all the mountain sides. When the Comstock was in its zenith the wood and lumber business of the county was quite an important factor in its activity, but since the decline of the mines there this branch of business has been greatly crippled; yet there are annually cut from 15,000 to 20,000 cords of wood and 750,000 feet of lumber sawed.

In the eastern part of the county farming is carried on to a considerable extent. Upper Carson, Diamond, and Dutch Valleys are the chief seats of this industry. In the elevated valleys among the mountains, summer dairying is an important industry.

The many beautiful lakes high up among the mountains are favorite summer resorts. The Blue Lakes, especially, are becoming a famous rendezvous for summer pleasure-seekers. In many parts of the county are mineral springs, both hot and cold.

The climate of Alpine County is, as its name and topography would indicate, decidedly alpine in character. With its western boundary in the high Sierra, and its whole area in the mountains, its winters are long and rigorous, and its snowfall deep.

In the valleys the soil is a heavy alluvium, very rich and fertile and yielding heavy crops where properly cultivated. But little fruit is grown in this county. Some very excellent apples and pears are produced, but owing to its remoteness from market, and lack of transportation facilities, little finds its way into the market, the entire output being used for home consumption.

ACREAGE AND VARIETY OF FRUITS IN ALPINE COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	8	7½	15½	1
Apricot		½	½	
Cherry	½	½	1	
Peach	½	½	1	
Prune	1½	2	3½	2
Pear	1	1½	2½	1
Plum	1		1	½
Table grapes	1		1	
Small fruits	2½		2½	
Totals	16	12½	28½	4½

Some little irrigation is done here, and a number of ditches, diverting water from the mountain streams, have been constructed. These, however, are principally for mining purposes. They aggregate 16 miles in length and are valued at $3,760.

WATER DITCHES IN ALPINE COUNTY.

Name.	Miles.	Assessed Value.
West Carson River Ditch	3	$1,500
Deluchi Bros. Ditch	1	200
Diamond Valley Ditch	2	600
Welch & Gallaner Ditch	4	900
Thompson Ditch	2	300
Markleeville Ditch	2	160
Riverside Ditch	2	100
Totals	16	$3,760

AMADOR COUNTY.

Amador County belongs exclusively to the foothill section, and has an area of 650 square miles, or 416,000 acres. It is bounded on the north by El Dorado, south by Calaveras, east by Alpine, and west by San Joaquin County. It is very irregular in shape and extends from the summit of the Sierra Nevada range to the Sacramento Valley. The eastern portion is very narrow, and for a distance of 25 or 30 miles is embraced within the upper foothills region, having an elevation of from 2,000 to 4,000 feet above the sea; its surface is rugged and broken, the streams finding their way through deep cañons, and the mountains are well timbered. The rest of the county, or lower foothills region, is hilly and partly timbered, and is interspersed with numerous fertile valleys varying in length from 3 to 6 miles and in width from 2 to 3 miles. Ione and Jackson Valleys are each 12 or 15 miles long and from 2 to 5 miles wide. The soil is a red loam, more or less gravelly, with a scattered growth of oaks.

The county has a length from west to east of about 55 miles, with an average width of 12 miles, and varies in altitude from 335 feet above ocean-level at Ione City to over 800 feet in the northeastern part.

It is difficult to describe the climate of Amador, varying as it does in consonance with the varying topographical features of the county. In the lower portions the summer months are like those of the Sacramento Valley—the days usually warm, sometimes hot, with breezes in the afternoon and cool nights. The winter months are pleasant, with occasional frosty mornings and an average rainfall the same as Sacramento. As a higher altitude is reached a different climate is found; cool and spring-like in the summer, and decidedly wintry in the winter months, with biting frosts and heavy falls of snow.

The average rainfall at the two principal points in Amador County, from the records of the past ten years, is as follows:

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Ione	2.62	3.07	3.89	3.96	1.17	0.42	0.00	0.00	0.23	0.39	1.26	2.62
Jackson	5.25	5.85	5.59	5.30	1.56	0.33	0.00	0.00	0.23	1.88	2.06	3.76

The soil in Amador ranges from a heavy alluvium in the lower portions of the county, with a large admixture of adobe, through the redlands of the foothills, to a gravelly loam in the higher hills and the granite formations of the mountains.

At Ione the soil is an alluvial deposit, deep, rich, and very fertile. Advancing toward the foothills this changes to the red adobe characteristic of the whole foothill region of the Sierra, very heavily impregnated with iron, and in which is found some of the best fruit land of the State. In the higher foothills the red land becomes more gravelly, until, as it reaches the higher altitudes, rocky would better describe it. Along the Mokelumne River bottom, where the best fruit farms are found, a deep black loam prevails. The "Q" Ranch, the principal fruit farm of Amador County, is planted in this soil, and its returns are very large.

Irrigation is not needed in Amador, but as one of the results of early mining operations in Amador, the county is traversed by innumerable canals and water ditches, which can be utilized, if necessary, for irrigation purposes. These canals and ditches are supplied from never-failing sources. The county is also singularly favored in the matter of water power for manufacturing purposes, and some day these great agents of commerce will be utilized. It is bounded on the north in part by a fork of the Cosumnes River, and on the south by the Mokelumne River. Numerous creeks, flowing independently of these rivers, aid in supplying the county with an abundance of water. There are several canal systems which supply water in Amador County, but the greater part of them are for mining purposes only, and some are dry during the irrigating season. The two principal companies are the Blue Lakes Water Company, which supplies the districts of Jackson, Sutter Creek, and Amador, and the Campo Seco and Mokelumne Hill Flume Company, which supplies the districts named in the title. These are both mining systems, and water for irrigation is supplied incidentally. Where the water is used for irrigation purposes the orchardists pay 25 cents per miner's inch for a twenty-four hours' flow, and it is used about four times in the season, between May and October.

Several small reservoirs have been built to save the winter water and lengthen the summer flow. Of these one is at the New York Ranch, one at Tanners, one near Sutter Creek, one near Plymouth, and one near Amador. These are all of small capacity, built for mining purposes only, and controlled by the Blue Lakes Water Company.

The following table gives the names of the canals, length in miles, and their assessed valuation:

Name.	Miles.	Value.
Amador, Volcano, and Walsh	10	$10,000
Buckeye	3	1,500
Lancha Plana	6	3,000
Home	3	1,500
Plymouth	16	10,000
Amador and Sacramento Canal	15	15,000
Cosumnes or Puritan Ditch	10	11,500
Blue Lakes Water Company's Canal	40	125,000
Minor private canals	5	3,300
Totals	108	$180,800

Besides these there are a number of smaller ditches taken direct from the rivers by farmers living along their courses.

The western portion of the county is admirably adapted to fruit growing. The same citrus belt traverses this county that enriches the northern counties of Butte, Nevada, and Placer, and some oranges and lemons of remarkable size and flavor have been produced here. The fruits grown in Amador are numerous in variety, and include peaches, apples, plums, prunes, grapes, nectarines, figs, and pomegranates. Grapes of all kinds do well, and some very excellent Zante currants have been produced. Nuts do well also, and the English walnut, almond, chestnut, hickory nut, butternut, hazelnut, and pecan are all found here. In the higher foothills apples do wonderfully well, attain a great size and fine flavor, and possess very superior keeping qualities.

The principal fruit sections of Amador are Ione Valley, Jackson Valley, Jackson, and Sutter Creek, in the order named. Grapes are the favorite fruit in most parts of the county, as they thrive on the rich foothill soil, grow without irrigation, and require little attention. After grapes will follow peaches, apples, prunes, plums, apricots, pears, and other deciduous fruits in minor quantities. Olives and figs wherever grown do well, but no attention has been paid to these fruits for commercial purposes on an extensive scale.

ACREAGE AND VARIETY OF FRUITS IN AMADOR COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	112	15	127	5
Apricot	50	65	115	50
Cherry	10	8	18	3
Fig	20	14	34	5
Olive	1	7	8	1
Peach	120	223	343	180
Nectarine	8	18	26	7
Prune	30	184	214	112
Pear	41	30	71	18
Plum	10	23	33	12
Lemon		1	1	1
Orange		2	2	1
Nuts—Almond	12	32	44	15
Walnut	3	6	9	2
Raisins	3		3	
Table grapes	5		5	
Small fruits	20		20	
Totals	445	628	1,073	412

The fruit crop of Amador this season has been very light. Peaches in most parts did not yield over half a crop, and in the most favored localities not more than two thirds. Apples were about the same, and so with most other fruits, except pears, which were reported as average.

Stockton is the nearest important town to Amador County, and most of the fruit exported finds its way there; some is sent to San Francisco and Sacramento, where it is consumed by the canneries.

BUTTE COUNTY.

Butte County, which has earned the right to a position in the front rank of the horticultural counties of the State, is located in the extreme northeast portion of the Sacramento Valley, and is bounded on the north by Tehama, east by Plumas, south by Yuba, and west by the Sacramento River. Its width is about 60 miles, and its extent north and south 8 miles, passing the 39th and 40th parallels of north latitude. This area is divided between valley, foothill, and mountain. Of the hill lands 200,000 acres are timbered and 240,000 acres are mineral. It embraces 1,720 square miles, which may be divided into 160 square miles of mountain, 965 square miles of foothill, and 595 square miles of valley land. Of the valley land 70 square miles consist of treeless abode soil. The Sierra Nevada Mountains on the east are not lofty nor precipitous, and there are no high peaks upon which the snows of winter remain during the summer months. The mountains are heavily timbered, and filled with grassy meadows.

Along the western boundary of the county, for its greater part, the Sacramento River runs, while in a northerly and southerly direction the county is bisected by the Feather River. Butte and Chico Creeks, two streams of considerable volume, run the greater part of their length through the county, while Pine, Mud, Deer, Edgar, Little, and Big Butte Creeks, and a large number of minor streams, find their source in the adjoining mountains and debouch on the plains of Butte, making her one of the best watered counties of the State.

The climate is almost as varied as are the topographical features. In the lower foothills and valleys the weather is mild and equable, with occasional hot days in the summer months. The winter climate of the valley is never severe, and frosts are of rare occurrence. A thermometrical record, kept for sixteen years, does not show the mercury to have touched a lower point in all that time than 22° above zero. In the higher foothills the heat is less intense in summer, nor is the cold so severe in winter. In the high mountains an Eastern climate prevails in the winter, and during the summer the air is spring-like and balmy.

The soil may be divided into four classes. Around Biggs, Nelson, and Durham a black adobe prevails, which has been found better adapted to cereals than to fruit growing. At Dayton, Chico, and Nord the character changes to a mixed clay and adobe, which is considered good grain, hay, and fruit land. Then come the red lands of the foothill regions, found excellent for fruit, and by many experts considered the best soil for horticultural pursuits. This, if summer-fallowed, yields heavy returns in hay and grain. In the river bottoms and along the southern portion of the county, it becomes a sandy loam, very rich, easily worked, and deemed equally good for all classes of vegetable growth. The western portion of the county is an extended plain, exceedingly fertile, and capable of producing in abundance fruit and cereals of almost all varieties.

The soil of the bottom land that borders the river is so little above the river level, and the soil is such a light alluvium, that the water of the stream percolates through it and keeps it moist and in fine condition for grain, grasses, fruit trees, and in fact all kinds of vegetation, through the whole year.

With her numerous streams, abundant water supply, and topographical advantages, Butte possesses extraordinary facilities for irrigation works—a fact to which capitalists are already awakening. Two large canals, originally constructed for mining purposes, terminate at Oroville, and are now used for irrigation.

An immense scheme is now under way for diverting the water of Feather River, where it leaves the Big Bend tunnel, to the east and west into two large canals, which would give sufficient water to irrigate all the arable land of Butte and much of that in the adjoining counties. With the completion of these works many thousands of acres of land will be devoted to orchard and farm purposes which are now idle or held in large bodies for cereal culture. The Biggs "Argus" outlines the advantages to Butte from the completion of the great work, as follows:

"The completion of the Feather River Canal Company's canal from the Feather River to Biggs and then on via Gridley to the Buttes, also the branch canal which will convey a large stream of water in a northeasterly direction through the redland section up by Shippee's and Nelson, is going to be a big factor in the greater development of the fruit interest of this section. While it is true that the river lands do not need irrigation for the growing of deciduous fruits, it is also true that water is necessary to grow nursery stock, especially June buds. So it will be seen that irrigation will be an advantage to the orchardists on Rio Bonito, even though they do not actually need it to produce excellent fruit. But the red lands lying on the east and northeast of Biggs, and extending even as far as Thermalito, are the lands that actually require plenty of irrigation, especially for orange culture, which we believe will be eventually the principal tree planted in this soil. There are many thousands of acres of the red lands embraced in the territory above mentioned, and there is no land in the county that will grow finer oranges, lemons, olives, and grapes. The Rose place of 1,200 acres, now in wheat, and thousands of acres surrounding it, will, in the course of a few years, be devoted to fruit culture. All these red lands will be reached by the water from the canal, and when the canal is completed and the water is brought to the land, wonderful developments will follow. The canal company have the means in their hands of doing great good in western and southern Butte, and the people of this section are doing themselves and the country a grave injustice in not urging the completion of the canal at the earliest possible moment."

There are a very large number of canals in Butte, about equally divided between irrigation and mining. The greater part of the mining ditches supply water for irrigation also.

IRRIGATION WORKS IN BUTTE COUNTY.

Name.	Miles.	Assessed Value.
South Feather Water and Union Mining Ditch	53	$280,000
Frank McLaughlin Mining Ditch	13	910
C. L. Cutting Mining Ditch	32	4,000
Palermo Land and Water Co. (irrigating)	39	19,400
Thermalito Colony (irrigating)	24	6,150
Spring Valley Gold Co. (mining)	50	4,500
Private ditches (mining and irrigating)	120	1,200
Totals	331	$316,160

Horticulture in Butte County, while always receiving some attention, did not attain the importance it deserved until after 1886. In that year the first premium for citrus fruits was awarded her at the Northern California Citrus Fair, which event gave an impetus to the industry, and especially to the citrus branch of it. Since then wonderful strides in this direction have been made, until horticulture has become one of the principal industries of the county, and promises soon to overshadow all others.

The Gridley "Herald," speaking of the rapid growth of horticulture in this county, says that a few years ago the orchard area was very limited. Now it extends clear across the country to the Feather River, and each succeeding year witnesses a big increase devoted to fruit. Rio Bonito is the nearest colony; its 2,000 acres of orchard present a healthy growth and perfect cultivation. And the end is not yet. Every year now will see the prosperity of that section of country growing as rapidly as fruit trees grow in this favored locality. The land adjoining Gridley has, in fact, become too valuable for cattle grazing and grain growing; every acre of it is good for fruit, vines, nuts, and berries. Palermo and Thermalito colonies, in the citrus belt, appear as wonders of the age when it is known that the lands they include were, but a few years past, exclusively reserved to herds of animals. Now they are the home of the orange, fig, vine, and olive, possessing the possibility of making, if not a thriving town, at least a prosperous and important village.

With its great variety of soil, climate, and altitude, Butte is adapted to a wide range of varieties of fruit, and all, except that of the tropics, will flourish here. The apple of the north, the orange of the south, the cherry, the fig, the guava, and the pear, grow side by side, and all do well. The Assessor's report, which errs on the side of conservatism, shows that there are 770,000 fruit trees planted in this county, which places it seventh among the horticultural counties of the State, being surpassed only by Los Angeles, San Bernardino, San Diego, Santa Clara, Solano, and Sonoma. There are 118,012 orange trees, which places her fifth among the citrus counties. Besides this, Butte has 111 acres of wine grapes, 66 acres of table grapes, and 604 acres of raisin grapes, making in round numbers about 800 acres. But seven other counties show a larger area of vineyards.

The cherry is one of the favorite fruits. It grows to perfection, and is the earliest fruit in the market. The trees attain an enormous growth and bear wonderful crops. As a market fruit it has been found very remunerative. It will grow in most soils, but thrives best in the rich alluvium of the river bottoms. Its range of altitude is equally wide, and it does well from the side of the Sierra, 3,000 feet above sea-level, to the banks of the Sacramento River. In General Bidwell's orchard is one tree, from which a few years ago the fruit was weighed, and it produced in a single season almost a ton of cherries, netting nearly $200.

The apricot is also a favorite, and does equally well with the cherry, with which it shares the popular esteem. It precedes the peach, ripening in the latter part of May and the early part of June. The varieties generally do well, and, like the cherry, flourish in all soils and at various altitudes. The tree grows vigorously, bears early, and the crop has been found a profitable one.

The peach finds its home in Butte County, and some of the trees here have been in bearing continuously for thirty years past. There is no part of the county where the peach will not do well if care is taken in the selection of stock for the soil, and any kind of care is bestowed upon the young trees.

Butte County produces some very excellent apples. The trees make a thrifty growth, are remarkably healthy, and bear very heavily. They have proved themselves a very profitable crop, and varieties do well in almost any part of the county, the mountain sides being especially adapted to their requirements.

Citrus fruits do well over a large portion of the county, and Butte is entitled to the position of leader in the northern citrus belt. Prior to 1886 citrus culture was largely experimental, although even at that date the fact that oranges would grow there and could be made a profitable crop had gradually forced itself upon the attention of fruit growers. The winning of the award at the Northern California Citrus Fair in Sacramento in 1886 confirmed the belief of the citrus growers there, and a great impetus was given to the new industry, until to-day Butte is better known for her production of citrus fruits than for those which have so far proved of greater commercial importance. The colonies of Thermalito and Palermo have taken their chief impetus from the fact that oranges will grow there. In the former colony large tracts have been set to citrus fruits, and the planting of orange trees has not lessened, but rather increased with time. During the past season among other plantings at Thermalito, Major Jones put out 1,200 budded trees and 6,000 seedlings; F. S. Foote set out 2,200 Parson Browns, Mediterranean Sweets, and Navels; Colonel Dameke, 1,200 budded trees; Fred Stanton, 1,400 budded trees; E. C. Goodrich, 1,800 budded trees; Mrs. Goodrich, 5 acres; Major Risher, 1,800 trees; W. B. Martin, 2,000 trees, and Miss A. Briggs, 10 acres.

In figs Butte equals any section of California. The tree there grows very rapidly, bears early, and yields very large returns. Some White Adriatics, packed by Legget & Son last season, were remarkably fine, and were pronounced by those who saw them equal to the imported fruit.

Much attention has also of late years been paid to olives, which do well in most parts of the county. A great many trees are now in bearing with such good results that large areas of new land have been planted to this fruit.

Plums and prunes grow in all soils, and do well in all. A great deal of attention has been given to the growing and curing of the prune of late, and a number of large orchards have been planted in Butte, in all of which an encouraging advance has been made.

Among other fruits found here in commercial quantities are almonds, nectarines, quinces, mulberries, pomegranates, and all the small fruits, besides large areas in grapevines. There are over 1,000 acres in vines in the county, and at the Paris Exposition in 1887 the premium for raisins was awarded to Butte County. The first carload of oranges shipped from this State for the season of 1891-2 went from Butte County, having been shipped on December 12th.

Butte finds a market for her fruit at the Marysville cannery, her home cannery, and in the East and San Francisco. About 5 per cent of the output is consumed in the mining districts of the county. For Eastern shipments green fruit is packed in regulation boxes adopted by all Eastern shippers. Peaches, pears, and large plums are wrapped in paper. Grapes and plums are packed in four and five-pound baskets and crates. Dried fruit is packed in boxes of 25 and 50 pounds, or shipped in sacks, as demanded.

The output of different varieties for 1891, together with an estimate for 1892, is appended. The figures for the present season are gathered from the most authentic sources, and will not vary much from the official returns when the season is over.

OUTPUT OF FRUIT FOR BUTTE COUNTY.

	1891.	1892.
Peaches	5,529,260	6,000,000
Prunes	677,400	200,000
Nectarines	83,800	20,000
Apricots	385,900	90,000
Quinces	4,200	4,000
Almonds	188,000	300,000
Grapes	920,000	800,000
Pears	213,200	150,000
Plums	561,500	300,000
Apples	1,060,200	700,000
Blackberries	20,600	21,000
Cherries	165,200	10,000
Totals	9,809,260	8,595,000

The central and northern part of Butte County was visited by a severe storm in the spring, which seriously injured the fruit, and many kinds were almost destroyed. A large increase in peaches coming into bearing, made the total of this fruit larger than last year. The same is true as to almonds. Prices have ruled much higher this year for dried fruit, which more than compensated the grower for the shortage, as will be seen from the following statement of prices paid for dried fruits last year and this:

	1891.	1892.
Cherries	3¾ to 4½ cents.	7 to 10 cents.
Peaches	1¼ cents.	3 to 3½ cents.
Pears	¾ to 1½ cents.	1¾ to 3 cents.
Prunes	1¼ cents.	2½ to 3 cents.
Nectarines	1 cent.	2 to 3 cents.
Apricots	1¼ cents.	1½ to 2 cents.
Almonds	in hull ¼ cent.	soft, 13 cents.
Grapes	packed ¾ cent.	2 to 2½ cents.
Plums	⅝ to ¾ cent.	2 to 3 cents.
Apples	½ to 1 cent.	1 to 1¼ cents.
Blackberries	3 cents.	3 cents.

The output of dried fruits in Butte in 1891 was 1,100,900 pounds.

The principal fruit sections of Butte are Palermo, where are found conditions suitable to the growth of both citrus and deciduous fruits; Thermalito, for citrus, olive, fig, and deciduous fruits; Rio Bonito, in which the peach and almond excel; Chico, for almonds and deciduous fruits, and Oroville, for oranges, olives, and figs.

There has been a very large addition to the fruit acreage of Butte during the present season, some 1,500 acres having been planted since the opening of the year. This is divided among the various classes of fruit in the following proportion:

Deciduous fruits	66,800 trees.
Citrus fruits	42,980 trees.
Olives	35,800 trees.
Total	145,580 trees.

The oldest orchard in Butte is that of General Bidwell at Chico; following this were the Hilgas orchard, between Rio Bonito and Thermalito, the Guill orchard at Chico, and that of the Hon. John C. Gray at Oroville. The oldest orange tree in Northern California is at Bidwells Bar, and the oldest orange grove is that of J. Gardella at Oroville. The earliest fruits planted were peaches and pears, apples and cherries, the stock for which was procured from the old Missions, or imported from the Eastern States.

As giving some idea of the adaptability of Butte County to fruit, the following statement from General Bidwell of the output of his orchard in 1891 is given. A very accurate account is kept in this orchard, and the figures are correct. This is the output of 500 acres on the Rancho Chico:

Blackberries	19,626 pounds.
Cherries	145,201 pounds.
Apricots	285,815 pounds.
Quinces	3,172 pounds.
Grapes	521,447 pounds.
Apples	662,209 pounds.
Pears	113,178 pounds.
Almonds	148,044 pounds.
Nectarines	81,783 pounds.
Prunes	377,416 pounds.
Plums	461,542 pounds.
Peaches	2,529,246 pounds.
Total	5,348,679 pounds.

ACREAGE AND VARIETY OF FRUITS IN BUTTE COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	204	103	307	27
Apricot	310	230	540	112
Cherry	80	85	165	20
Fig	60	199	259	110
Olive	55	700	755	187
Peach	1,180	2,106	3,286	873
Prune	300	731	1,031	258
Pear	200	713	913	210
Plum	51	170	221	62
Lemon	5	15	20	3
Orange	500	2,164	2,664	525
Mixed orchards	100	109	209	27
Nuts—Almond	560	1,028	1,588	320
Walnut	5	7	12	2
Chestnut	----------	10	10	2
Raisins	394	----------	394	----------
Table grapes	293	----------	293	----------
Small fruits	18	----------	18	----------
Totals	4,315	8,370	12,685	2,738

CALAVERAS COUNTY.

Calaveras County is located almost directly east from San Francisco, from which it is distant about 130 miles. It is bounded on the north by Amador, east by Alpine, south and southeasterly by Tuolumne, and on the west by San Joaquin and Stanislaus Counties. It is triangular in shape, its longest sides being 54 miles in length, and its base, resting upon San Joaquin and Stanislaus, being 32 miles across. It has an area of 971 miles, or 668,000 acres.

The topography of the county may be described as an aggregation of rolling hills and small valleys. Many of these valleys continue up into the adjoining hills, which at places become mountainous in size. The hills are usually covered with a growth of oak or pine timber, sparsely scattered over the land where unimproved.

Along the whole northern boundary of the county the Mokelumne River runs, and tributary to this is the South Fork of the Mokelumne, with its numerous branches. Extending along the southern boundary is the Stanislaus River, tributary to which, in the county, are Mill, Coyote, Six-Mile, Angels, Black, and Rock Creeks. Extending through the county midway between the boundary streams is the Calaveras River, with its tributaries, the Jesus Maria River, San Antone Creek, Middle Fork, and South Fork. These streams and their branches are tapped at various points, and their waters distributed through 525 miles of ditches to various parts of the county. Many springs are also found in the foothill region.

From the peculiar formation and location of the county, the climate is remarkable and widely varied. Divided climatically, the western, or valley portion, with an average width of 10 miles, has an average mean annual temperature of from 60° to 68°. The foothill section adjoining, to a width of 32 miles, has an average temperature of from 44° to 52°. Some snow falls in that portion of the county. The coldest weather recorded within the limits of the county was in June, 1888, when the whole State was visited by the nearest approach to a genuine blizzard that was ever experienced in the history of California. At that time, at Mokelumne Hill, San Andreas, Valley Springs, Copperopolis, Burson, Wallace, and Jenny Lind, in Calaveras County, it averaged 22° above zero. In the most severe cold spell recorded since 1814 the mercury in the middle belt of the county fell to zero. From May until October the county is without storms. From October to May frequent and abundant rains fall. The summers are similar to all the inland counties of California. The thermometer may linger about 100° at midday, but the nights are invariably cool and refreshing, and fully compensate for the heat of the day. There is an absence of fogs and chilling winds.

The rainfall in Calaveras County is usually ample to insure crops. A record kept by H. Turner, at Valley Springs, showed a total of 13.90 inches for the season of 1887-8, 14.56 for 1888-9, and 33.15 for 1889-90. This total increased with the altitude until the snow-line was reached. The snowfall is always heavy, and insures an ample supply of water for the streams through the summer months.

There are a variety of soils in the county, each variety possessing desirable qualities. All of the soil, however, is impregnated to a greater or less extent with granite, slate, and limestone particles. Limestone abounds throughout the county, and the rains percolating these limestone hills, dissolve its particles, only to mix them with other soil lower down. The higher mountains of this county are composed principally of gigantic bowlders and ledges of granite. From the effects of the weather, snow, frost, and rain, these exposed particles are disintegrated, and the fine sand is constantly being washed down to enrich the soil of the lower foothills. The lower foothills are a succession of strata of slate formation. This slate is generally very soft, and disintegrates and breaks up easily. It will then be seen that the foothill soil is composed chiefly of granite, slate, and limestone. Mixed with these soils are at times gravel, clay, gypsum, and other deposits. It not infrequently happens that on one 80-acre farm every one of these varieties of soil is to be found. To the northeastern part of the county is a granite soil; following this comes the red loam of the foothills; then the sandy, alluvial soil of the plains; next the black sandy loam of the bottom lands. In the granite belt the more hardy fruits, the apple, pear, and plum, with the vine, thrive, while on the red, loamy hillsides is found excellent land for fruit and vine culture. The plains are largely given to grain. The rich river-bottoms grow, without irrigation, fruits of all descriptions, together with large tracts of corn and melons.

The loamy hillsides of the foothill section are tinged a dull red by the ferruginous ocher which abounds. Many fruits require such soil in order to be produced to their greatest perfection. This soil is adapted to irrigation; it is loose enough to receive water without baking, while the drainage is perfect. The river-bottom lands are easily cultivated and require no irrigation, as the ground is always moist. The sandy, alluvial soil of the plains is strong and deep; fruit grows well without irrigation on these soils, but requires thorough cultivation, that the moisture ascending by capillary attraction may be arrested by the loose soil of the surface, which may be said to act as a mulch.

On the southeast portion of the county the Union Water Company's 90 miles of ditches take 10,000 inches of water from the North Fork of the Stanislaus River at a point about 8 miles from the extreme eastern boundary. In addition, their reservoirs hold in store an amount of water sufficient to supply 500 inches a day for twelve months. This water is distributed through the district around Big Trees, Murphys, Vallecitos, Douglas Flat, Angels Camp, Altaville, and thence to Copperopolis. Joining the Union Water Company's ditch on the north is the Table Mountain Ditch, taking 500 inches of water from the San Antone Creek and conveying it to Sheep Ranch. Also the Ide Ditch, covering 25 miles of country as it flows to El Dorado, Cave City, Old Gulch, San Andreas, and vicinity. The South and Middle Forks of the Mokelumne River cover the country between Railroad Flat and West Point. The Middle Fork carries an average of 1,000 inches. The Blue Lakes, with a capacity of 10,000,000,000 gallons, empty into the South Fork of the Mokelumne River, while the North Fork of the Mokelumne River has a natural site for a reservoir that can be made to hold 800,000,000 gallons of water, an amount which is more than sufficient to supply the wants of Oakland and San Francisco. This system was once surveyed and thought to be feasible for that purpose.

The Clark Ditch takes its water from the South Fork of the Mokelumne, near the Calaveras Big Trees. It extends thence westerly over a belt of country about 32 miles long. This system can be extended to cover all the county lying below in the northwestern corner. Joining this system on the extreme north is the West Point Ditch, taking 400 inches of water from the Middle Fork of the Mokelumne River, at a point 6 miles east of West Point, and conveying it thence to West Point and vicinity.

Following the Clark Ditch into the valleys is the Mokelumne and Campo Seco Canal and Water Company's ditches. One ditch takes 1,000 inches of water from the South Fork of the Mokelumne River 2½ miles northeast from Glencoe. Their reservoir near Railroad Flat gives, in addition, a daily supply of 200 inches of water for the three months. This extensive canal system covers and supplies Mokelumne Hill, Gwin Mine, Campo Seco, Valley Springs, Burson, Wallace, and Comanche.

The Salt Spring Valley reservoir, formerly the source of supply for the North Hill Mine, near Milton, furnishes another considerable source of supply, from which water may be obtained for irrigating purposes.

The Lancha Plana and Poverty Bar Ditch, which takes its water from the main branch of the Mokelumne River at Italian Bar, after passing out of the Calaveras, leads into the counties of Amador and San Joaquin, reaching a point in the last named county within 14 miles of Stockton. While these ditches are principally used for mining purposes, they serve to show what can be done by a system of intelligently conducted irrigation works, supplied from storage reservoirs, for which numerous sites can be found in the county, and to supply which there is abundant water.

The assessed valuation of the waterworks and canals of Calaveras County is given herewith:

Name.	Assessed Value.
Lancha Plana and Poverty Bar Water Co.	$5,000 00
Union Water Co.	50,500 00
Mokelumne and Camp Seco Canal Co.	50,000 00
Hurley Mining Company's Ditch	3,000 00
W. V. Clark's Ditch	6,000 00
California Company's Ditch and Reservoir	25,000 00
Georgia Ditch	250 00
San Antone Ditch	1,500 00
Pope's Ditch	500 00
Table Mountain Ditch	3,000 00
Old Gulch Ditch	1,000 00
Total	$145,750 00

Calaveras produces a long line of fruits, both citrus and deciduous. It is not as a horticultural county that Calaveras is known, as its energies have, heretofore, been more directed to mining and agriculture, excelling in hay, grain, and potatoes. Of late years, however, a great deal of attention has been given to fruit growing, and with excellent results.

In the citrus belt, which embraces the northwestern end of the county, the orange, lemon, citron, and olive are found thriving in places with great luxuriance. Citrus fruits have not been grown extensively up to the present date, but when tried they seem to be a success. At Campo Seco orange trees can be seen which are thirty years old, and continue to bear remunerative crops annually. Mr. James, near the Reservoir, has also thrifty orange trees, some of which are of the second generation, having been grown from the seed of the ones first planted, some thirty years ago. This second lot has been bearing for a number of years, and yields fine, marketable fruit. At Jenny Lind, Poverty Bar, Robinsons Ferry, San Andreas, and other points, oranges mature well. At Mokelumne Hill, at an elevation of some 1,300 feet, oranges have been tried, and do well. At the Citrus Fair held in Sacramento City in 1886, Mr. Suesdorff, of Mokelumne Hill, exhibited a branch containing a cluster of forty oranges, which took the first prize as the best cluster. The first trees planted in the county were seedlings, and therefore the fruit is not so large as the improved varieties, but is of a delicious flavor. Of late years the better varieties have been selected, and some of them are coming into bearing. Mrs. O'Neal, of Valley Springs, and Mr. Suesdorf, of Mokelumne Hill, have some young trees of the Washington Navel variety, which are fruiting. Some orange trees are also growing at the Wheat place, on the San Andreas road, and one large lemon tree there has been in bearing for a number of years.

Olives do equally well, and a large number of trees have been planted of late years. Mr. Littlehale has trees in bearing which yield well. H. H. Moore has quite an extensive olive orchard, and Mr. Madden, J.

M. Lemon, H. Turner, and others have small orchards, all of which are reported as doing well.

In the eastern part of the county, where the rainfall is greater and the summers cooler, very fine apples are grown. This district is known as the apple belt, and large crops are annually produced, selling at good prices.

Other deciduous fruits do equally well, and the peach attains a very large size and flavor. Pears grow to an immense size. Apricots and plums grow to great perfection; nectarines thrive well; prunes are prolific, large in size, and dry with little shrinkage. In over one half the county the fig crop is certain and abundant every year, and that, too, without care or cultivation beyond merely planting the slip where the future tree may find depth of soil and sub-earth moisture sufficient to sustain its rapid growth and the development of its delicious fruit. The large blue fig is at home in damp localities, and thrives most luxuriantly when growing in ground that has been placer-mined over, by which the long, penetrating roots are enabled to reach moisture at a considerable depth. The adaptability of this county to growing this fruit bears out fully the report of the State Horticultural Society, through its committee on fig culture, stating that in their judgment the foothill district of this State was best adapted to the growth of figs.

For nut-bearing trees Calaveras seems to have congenial surroundings. In Vallecitos and Douglas Flat, and in many other portions of the county, the English walnut and almond grow thriftily and bear abundantly. Almonds are being extensively planted and are hardy growers. They stand neglect better than other trees, and will grow in some soils, by the assistance of assiduous cultivation, without irrigation. The almond is an article of large importation to the United States; very little, if any, of the Atlantic Coast is suited for its culture, therefore there is but little danger of overproduction. The season for harvesting this nut may be made long if desirable. The trees are free from pests, and finally they will flourish and produce good crops on soils which are too dry to grow good peaches, or similar pulp fruit. For these reasons the almond is sure to become one of the staple productions of Calaveras, as at other points on the coast. The scale bugs do not seem to prosper here in the warm, dry climate, and are seldom found. When found they are easily driven away by the usual remedies.

The crop outlook for the present season is not so good as usual; a late frost, coming when the trees were in bloom, killed off a large portion of the crop. At Mokelumne Hill peaches will give but one fifth of a crop, apples one half, plums one half, prunes two thirds, and apricots one half. The same proportions will hold good in most parts of the county. In some of the more favored localities less damage was done, and the returns will be larger, but over the whole county it is safe to estimate that there will not be over half a crop.

Much of the fruit grown is dried and sacked, in which shape it finds a ready market at Stockton. The green fruit is shipped in 50-pound boxes to Stockton, Sacramento, and San Francisco. The greater part of the green fruit shipped consists of apples, the lack of railroad facilities and long distances over which it is necessary to transport fruit in wagons rendering the shipment of other varieties unprofitable. Last season Stephen M. Hughes, of Mokelumne Hill, shipped 42 tons of apples to Stockton; 85 tons were shipped from West Point, and of assorted fruits San Andreas shipped 10 tons, Jenny Lind, 10 tons, and Wallace and Burson, 12 tons. Add to this shipments from other points and those made by individuals not engaged in the shipment of fruits, and the total export of fruit from Calaveras would foot up to nearly 200 tons for 1891.

The pioneer orchard of Calaveras was planted in 1855 at Glencoe, by J. Woodcock, who planted a lot of seed obtained from dried apples imported from the East. The orchard is now owned by the son of the original owner, and the trees are bearing still.

Small fruits do well, and many people have a small patch of blackberries, raspberries, and strawberries for home consumption, but none are grown for export.

The principal fruit sections of Calaveras are Campo Seco, Jenny Lind, Mokelumne Hill, Burson, Murphys, Vallecitos, Robinsons Ferry, and Douglas. Of these sections Murphys, which is located in the more elevated portion of the county, is celebrated for the superior quality of apples, which grow remarkably large and possess good keeping qualities. In the lower portions all classes of deciduous fruits thrive. At Burson, Mr. Moore has an orchard of three hundred olive trees planted three years since, which are growing very thriftily and promise early returns to their owner. On the Cuttler place, at the same location, are several large orange trees and two very large English walnut trees, which bear heavily. An English walnut orchard is owned by Mrs. Batten at Vallecitos, which yields good returns. Burson is on the line of the San Joaquin and Sierra Nevada Railroad, and a very large area has been set to new fruit in its vicinity, East rail transportation having given an impetus to the industry.

ACREAGE AND VARIETY OF FRUITS IN CALAVERAS COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	172	18	190	3
Apricot	20	33	53	7
Cherry	12	7	19	3
Fig	18	8	26	1
Olive	15	105	120	50
Peach	146	194	340	85
Prune	8	61	69	23
Pear	85	25	110	12
Plum	30	20	50	3
Quince	1	----------	1	----------
Orange	1	14	15	9
Nuts—Almond	30	59	89	31
Walnut	12	11	23	5
Raisins	23	----------	23	----------
Table grapes	154	----------	154	----------
Small fruits	64	----------	64	----------
Totals	791	555	1,346	232

COLUSA COUNTY.

Colusa County comprises a large portion of the great Sacramento Valley. It is bounded on the north by Glenn, south by Yolo, east by Sutter, and west by Lake. The southeast corner, on the Sacramento

River, is 40 miles in a right line over Sacramento City. A line due north from San Francisco runs a little west of the center of the county. The county is 30 miles from north to south, and will average in the neighborhood of 40 miles from east to west.

Of the 2,800 square miles, or 1,800,000 acres, in the county, some 1,500 square miles lie in the Sacramento Valley proper. As the summit of the Coast Range forms the western boundary, the balance of the county is mountains, low hills, and small valleys. The valley portion of this balance is estimated at 200 square miles, and the low, arable hills at 700 to 800 square miles. This is a vast extent of fertile lands. The mountain and hill ranges run north and south. Through the entire length of the county there is a series of ranges of hills running parallel with the coast mountains; between these are small, narrow valleys. Stony Creek heads within 20 miles of the south line, and a low divide separates its waters from those of Cache Creek. Stony Creek runs north, along the base of the mountains, to the north line of Glenn County, where it breaks through the most eastern of the ranges mentioned above, and flows southeasterly across the valley to the river, entering it some 7 miles below the north line of Glenn County. The smaller creeks that rise to the east of Stony Creek break through, one after another, the several other small ranges, and find their way into the "trough" mentioned hereafter. Stony Creek is the last stream that enters the Sacramento River from the west. There are several other streams almost as large that head in the Coast Range, and flow through Yolo and Solano Counties into the tule basin, the same as the smaller streams we have noted above.

The whole of the Sacramento Valley was once either an inland lake or an arm of the bay of San Francisco. The wash from the mountains encroached year by year on the water and made the valley. The deposits that came from the Sierra on the east, and the Coast Range on the west, made the waters from the north keep a middle ground, and hence the Sacramento River runs down near the middle of the valley. Above the mouth of Stony Creek the deposits from the hills on either side have made a regular slope down to the river; but below that point, the valley being much wider, the river banks have grown much faster than the valley at the ends of the small creeks, and the consequence is that the river runs on a ridge, and the streams, which only run in wet winters, from the hills below empty into the trough thus formed. The overflow from the river also flows into this trough. This is on the west side. On the east side we have Butte Creek running on a lower plane than the river, and the overflow of the river gets back into it, while it is lost in the tule basin of Sutter County, which it is not our province to describe here. On the west side the head of the "trough" is some 6 or 7 miles below the mouth of Stony Creek; but it is still some miles below that before any streams make into it from the river. The farther south, the more water in the trough and the wider it gets, until, near the lower end of the county, we have a tule basin. The average width of the trough and basin in Colusa County would be, perhaps, 2½ by 40 miles.

The county lies in the Sacramento Valley, the greater portion being to the west of the river of that name. The county is divided into the Sacramento Valley portion, the foothills, and the higher range valleys and their bordering foothills. The western mountain portion rises to an elevation of 8,000 feet, and is covered with growths of pine, spruce, and cedar, the most of which is unentered government land.

From Williams, 150 miles to the north, Mount Shasta may be seen rearing its white-capped peak, apparently directly from the plains, like a gigantic pile of snow. To the northeast the Lassen Buttes appear like two grim sentinels guarding the valley; and far in the southeast the Marysville Buttes rise majestically from the plains.

The climate of the whole of the Sacramento Valley proper is substantially the same from the city of Sacramento to the central part of Colusa County, with this material difference: along the banks of the river, where bordered by timber, as it is for miles above and below Colusa, the temperature in summer is much lower than on the plains and in the foothills devoid of timber. The climate of some parts is very nearly perfection itself, and in the lower parts of the county the summers are warm. There are frosts in winter. Owing to the dryness of the atmosphere, and to the nights being cool and refreshing, even the heated terms of summer are not found oppressive. It may be said that almost any desired climate may be found in this county. In the valleys and foothills it is quite hot and dry during three months, the thermometer sometimes reaching as high as 110° for several days at a time, followed by cooler spells. However, nine months of most delightful weather follow the heated term. In the valley and foothills the rainfall begins generally in September, and continues at intervals until May. During the rainy season the weather is delightful—soft, balmy days like the spring of the Eastern States. The climate of the Coast Range Mountains, forming the west boundary of Colusa, is one of the finest and most healthful in the world. One can there get the altitude, find cold mountain water, and have the breeze fresh from the ocean; and by going up or down the mountain side, can find the precise temperature that will suit him.

The following table, compiled from the observations of a series of years, will show the average temperature of the different seasons, at the most prominent points in Colusa County:

	Princeton.	Williams.	Willows.	Orland.	College City.
Average winter temperature	48.2	47.5	45.7	52.6	48.4
Average spring temperature	61.4	61.7	63.0	65.1	63.3
Average summer temperature	78.7	79.6	81.5	81.7	76.6
Average fall temperature	63.3	63.6	64.5	67.6	60.9
Average yearly temperature	62.8	63.1	63.7	66.8	62.3
Highest temperature	114	114	112	113	114
Lowest temperature	19	19	19	22	19
Average rainfall, inches	15.25	12.09	12.03	16.36	16.35

The monthly precipitation in Colusa is given below, from records covering a period of ten years:

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Colusa	3.73	3.20	2.07	1.39	.51	.39	.40	.20	.16	1.01	1.45	3.25
Orland	1.95	.93	2.90	2.23	1.15	1.24	.00	.00	.20	1.73	1.45	.47
Princeton	3.24	2.24	1.90	1.40	.63	.48	.11	.30	.15	1.14	1.44	2.18
Williams	2.83	1.77	1.55	1.37	.53	.43	.00	.00	.16	1.01	.82	1.69
Willows	2.09	1.32	1.69	1.81	.55	.16	.00	.10	.16	.54	1.06	2.31

Generally the soil is very fertile, but presents a much varied character. Along the river, the borders of the foothills, and in the many small valleys, it is a loose, rich, sandy loam, easily cultivated, retaining moisture wonderfully, and of exceeding fertility. In some portions of the valley proper, it is an adobe, a light or heavy clayey soil, which produces excellent crops when once under proper cultivation. The soil of the foothills is rich and mellow, is easily worked, and possesses every element and condition for the heaviest production of fruits of every variety known to the temperate and semi-tropical countries. The valley land is all alluvial, and so naturally adapted to the culture of cereals that Colusa has for years been the banner wheat county of the United States.

The soil of Northern California is of remarkable fertility. In the valleys of the Sacramento it was formed at the bottom of an immense lake, which received the washings and weatherings from the lofty ranges that surrounded it. For untold ages the potash from the decomposing granite formation, the magnesia and lime from the weatherings of the magnesian-lime strata, and the soda from the decomposed vegetation, were carried, year after year, and deposited in the bottom of this inland sea, where they were stored up in inexhaustible quantities for the use of the tillers of the land in later times.

Nature, not yet satisfied with what she had done for this, her favorite spot, after this great lake had become a thing of the past, continued her work of augmentation by washing from the hills and mountain sides, all streams, great and small, aiding in the work by carrying their deposits of sediment on to the level lands. The heavier material, when thrown over the banks by overflow, was soon deposited, while the lighter material was carried farther from the stream. Thus each stream made a varied soil.

The soil made by the Sacramento River is a light vegetable mold, mixed more or less with clay and sand. On this, vegetation in a state of nature grew much ranker than on the heavy soils made by shorter washes from the hills. The soil of the hills, and even of the mountains of the Coast Range, on the west side of the valley, is all good. Bunch grass, poison oak, and other vegetation, never seen upon poor land, grow there, and hence the little valleys among the hills, as well as the great valley, have good soil. The difference in the soils, then, was made by the settling of heavier or lighter deposits in different places. As the creeks came down the hills throwing up ridges, they would sometimes hem in, as it were, a tract of land so that it could not have sufficient drainage. This became cold and hard, and we called it alkali. The percentage of this kind of land is not great, and it is found that drainage, cultivation, and irrigation redeem it. The soil of the territory overflowed by reason of being in the trough, or basin, is also good, and most of it is farmed with success. On some of it as much as seventy-four bushels of wheat have been grown to the acre. As the soil of the hills is good, and as the greater portion of the area of the hills is susceptible of cultivation, there is but little waste land in Colusa County. Almost every quarter section on the great plains has now been brought under cultivation, and has yielded a profit; and the young man who reads this will see almost every acre of the hills of Colusa County covered with the vine, the fig, or some of the many and varied fruits, to the cultivation of which they have already been proved suitable.

While there are many places in Colusa County where irrigation is not required for growing any form of vegetation, over the greater portion of it irrigation is a necessity for the growth of any but cereal crops. To accomplish this the Central Irrigation District was organized in November, 1887, being one of the first to take advantage of the Wright law. This district is situated in the Sacramento Valley, upon the west side of the Sacramento River. Its upper or northernmost end is about 10 miles to the northeast of Willows (now the county seat of Glenn County). It extends southward from that point for nearly 40 miles, and it has an average width of between 6 and 7 miles. It includes within its limits the towns of Maxwell and Williams, and skirts the town of Willows. The district lies just to the west of the west side depression of the Sacramento Valley, in a region where the eye can barely detect any unevenness of the ground's surface, where soils are deep alluvium, and where nature has granted an average annual rainfall (which ordinarily falls between December 1st and May 1st) of 15 inches.

The Sacramento River, which is at high stages in the spring of the year, and remains at moderately high stages until August, and which does not fall to its lowest stages until late in autumn, is the source of water supply for the Central Irrigation District. The head of the district canal will be upon the west bank of Sacramento River, at a point near the extreme northern line of Colusa (now Glenn) County. The canal will cross Stony Creek at St. Johns, and will thence flow in a southwesterly direction past Willows, where it will cross the Northern Railway. Its general direction after reaching a position about three miles west of the railroad is southerly, until it is west of Williams, thence it is southeasterly to its termination at Cortina Creek. It will be cut to a grade line falling one foot in ten thousand. Its course throughout is in heavy soils, and the loss of water in transit to the lands of the district will be small. The canal will carry water 6 feet deep when full. It will be 96 feet wide between the levee centers, 84 feet wide on the water surface when full, 60 feet wide on the bottom, and its capacity will be 750 cubic feet per second (37,500 miner's inches).

These dimensions will be maintained for a distance of over 20 miles, to near Willows, where the water-surface width of the canal is first reduced to 79, and soon after to 74 feet. As the canal continues on its course along the western line of the district, its width is gradually reduced until it reaches the extreme southern district line with a water-surface width of 49 feet and a bed width of 25 feet. Water will be diverted from the Sacramento River without a dam, the canal being cut sufficiently deep to permit a free inflow of water. This inflow will be controlled by means of a massive headgate, to be constructed of brick, laid in cement. At 6 miles below its head the canal will cross Stony Creek at St. Johns. Its water will be conducted under the creek-bed in seven large wooden tubes. The inlet and outlet of this conduit will be constructed of brick, laid in cement. Throughout the entire course of the canal structures for the control of the elevation of the canal water, for the passage of drainage water across the line of the canal, for the distribution of water, and for canal crossings will, be provided.

At Willows the canal will cross the Northern Railway, and approaching the western edge of the valley lands will hold a southerly course to Cortina Creek, about 5 miles south of Williams. The entire length of the canal will be 60 miles, all across smooth-surfaced valley lands.

Contracts for the construction of 55 miles of the canal have been let, and 30 miles of this work have been satisfactorily completed. Including the work done to June 1st, 1,580,000 cubic yards of earth have been excavated by the six contractors or contracting firms now engaged on this work, at a total cost of $209,800. The only structures in place at the present time are bridges, of which fifteen have been completed. Contracts have also been awarded for the construction of the headgate and the crossing of Stony Creek. In addition to the contracts already awarded, there are contracts to the amount of $30,000 yet to be let to insure the completion and equipment of 55 miles of the canal, with check wires, inlet gates, outlets, culverts, creek flumes, and works for the crossing of small Coast Range waterways. The canal will be further extended as the necessary rights of way are acquired.

The main canal skirts the western or highest edge of the district, which is generally less than 4 miles wide, and, with its completion, water will be immediately available to nearly all parts of the district through a distributing system of natural waterways, crossed at short intervals by the main canal, and all to be provided with headgates.

The lands of this district, as has already been stated, are smooth-surfaced, and their slope is away from the canal toward the eastern boundary of the district, which lies near the bottom of the depression in the west-side plain of the Sacramento Valley.

Near the canal the fall of the land toward the east or southeast is generally about ten feet per mile. It decreases to five feet and even less as the eastern edge of the district is approached.

The exceptional smoothness of the surface of the ground which prevails in this district will facilitate the manipulation of the water. The cost of preparing lands for irrigation will be relatively small. The extension of irrigation to all parts of the district will be rapid.

The quality of soils throughout Central District, which has a length of 38 miles, by an average breadth of 6 miles, and which contains 165,500 acres of land, must necessarily be varied. As a whole it is good. Some can be ranked with the choicest in the State, and none will be found too poor to raise alfalfa when water is brought to it under control.

The range of productions in the same area is not surpassed by any other country on earth. Here all the products of the temperate and northern tropical belts meet and grow side by side to perfection. All through this region the pine and palm, the olive and apple, the orange and pear, the pomegranate and the plum, stand in the same orchard and do equally well. In this climate, and on these soils, all the nut-bearing trees attain to large size, and are prolific bearers. The mulberry, upon which the silkworm feeds, finds a congenial home in these valleys. Nature has made this the one spot where all the productions of two zones meet on common ground. Wheat, that food-plant peculiarly adapted to cold climates, and the orange from the semi-tropical zone, grow in the same field in the Sacramento Valley. The whole range of the productions of the temperate and semi-tropical climates, the equals in quantity and quality of those of any other place in the world, can be grown in Colusa County.

From wheat growing Colusa is rapidly passing to fruit growing, and in the past few years orchards have been planted by the hundreds of acres. Prunes appear to be the favorite fruit, and they do remarkably well. Peaches come next, and pears and apricots third. Considerable attention, however, has been given to citrus fruits in the past few years, and wherever they have been judiciously planted and properly cultivated, they have done well.

Fruit growing in Colusa is of very recent date, not preceding 1884-5, but in the short time that has elapsed since its introduction, it has made very rapid strides. Acres upon acres of orchard and vineyard are being added all around to those planted during the last three years. The experimental stage is past, and these industries will be pushed forward with the utmost activity. The local demand for raisin-grape vines alone has exceeded all sources of supply by more than 100,000. So with many varieties of fruit trees has the demand far exceeded the supply. Fruits of all kinds thrive remarkably in the rich river soils. The raisin grape especially flourishes, for Colusa County, it must be remembered, lies in the same latitude as the famous raisin regions of Spain. The dry, warm climate here presents all the conditions necessary for the production of a choice raisin. The soil of the Sacramento Valley generally is well adapted to the growth of a fine quality of grape. There is much land in the valley of Stony Creek, in Colusa County, that is not surpassed in the world for raisin grapes.

Not only is the county adapted to the vine and raisin, but during the past and several preceding years grapes, apricots, prunes, plums, pears, peaches, nectarines, cherries, apples, walnuts, figs, olives, lemons, and oranges have been extensively planted. A good deal of attention has also been given to small fruits and berries. About three fourths of the county is adapted to general agriculture, the remainder being mountainous, bearing some good timber and suitable, when subdued, for stock raising and the growth of hardy fruits. Colusa supports a drying and packing establishment, which put up a pack of over 4,300 cases last season. This establishment, known as the Colusa Canning, Drying, and Packing Company, was organized April, 1889, with a capital stock of $30,000, divided into three hundred shares of a par value of $100 each. Its pack for 1891 comprised 4,300 cases of assorted fruit, gave employment during the season to one hundred people, and paid out $22,181, as follows:

Paid for wages	$5,551 00
Paid for fruit	7,953 00
Other items	8,677 00
Total	$22,181 00

The principal fruits grown in Colusa are prunes, peaches, and apricots. These find a market in the East, Sacramento, and San Francisco, and are shipped green, dried, and canned. Apricots and prunes are dried and packed in sacks, the green fruit is shipped in boxes and crates. The value of the output of fruit from Colusa in 1891 was about $23,000, and the shipments of dried fruits were:

Apricots	50 tons.
Prunes	75 tons.
Pears	8 tons.
Peaches	30 tons.
Nectarines	3 tons.
Almonds	7 tons.
Total	168 tons.

Prices for fruit, both green and dried, ruled low, and were as follows:

	Green.	Dried.
Peaches	¾ to 1 cent.	4½ to 5 cents.
Apricots	¾ to 1 cent.	8 cents.
Prunes	½ to 1 cent.	5 to 6 cents.

The fruit crop of Colusa the present season was light, but the increase in prices over last year fully compensated for the shortage, and the growers will do better out of their orchards than they did in 1891. In the orchard this season peaches sold for 1½ cents, apricots 2 cents, and prunes at 1½ to 1¾ cents on the tree.

There has been a very large area of new land planted to fruit this year in Colusa County, nearly one half of the orchards having been planted during the spring of 1892. A comparison of the acreage in bearing and non-bearing trees will show how rapidly Colusa is changing from a wheat to a fruit-growing county:

ACREAGE AND VARIETY OF FRUITS IN COLUSA COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	6	3	9	2
Apricot	156	124	280	16
Cherry	8	11	19	2
Fig	21	5	26	11
Olive	2	8	10	2
Peach	43	186	229	21
Prune	167	637	804	28
Pear	100	179	279	22
Lemon	½	1	1½	1
Orange	1	8	9	1
Nuts—Almond	30	16	46	6
Walnut	20	40	60	10
Raisins	216	----------	216	----------
Table grapes	160	----------	160	----------
Total	930½	1,218	2,148½	122

CONTRA COSTA COUNTY.

Contra Costa County is one of the central counties of California, its shore-line being within 14 miles of San Francisco. It possesses unusually good traveling facilities, both by rail and steamer, which fact is proven by its boundaries, which are, on the north, the San Joaquin River, which separates it from Sacramento County; on the east, Old River, separating it from San Joaquin County; on the north, San Pablo Bay, Suisun Bay, and the straits of Carquinez; south and west, by San Francisco Bay and Alameda County. Its superficial area is 734 square miles, or 489,760 acres. Nearly half of this is cultivated, the remainder being grazing and waste land.

Across the county, extending in a southeasterly direction, parallel with the coast, the second great and distinct range of mountains forms a natural dividing line between the eastern and western sections. The distinguishing feature of this range is Mount Diablo, standing out boldly, 3,896 feet in height, towering above all the other peaks, and being very nearly in the geographical center of the county. The great central valley is the Ygnacio, extending from Suisun Bay southward to the base of Mount Diablo, 10 to 12 miles in length and 6 miles in width. Out of this branches Clayton Valley, 10 miles long. The San Ramon Valley is 10 miles in length, by from 1 to 6 miles in width. Besides these are smaller valleys, settled by thrifty and prosperous farmers. The farming lands in the eastern section of the county are between the foothills and the San Joaquin River. They are 23 miles in length, by from 3 to 6 in width, and embrace about 60,000 acres of arable land. The soil is, generally speaking, of a rich, alluvial nature, and produces wheat, barley, alfalfa, fruit, and vines. To the northward, and between the uplands and the San Joaquin River, is a body of tule lands, embracing, in all, some 50,000 acres.

The climatic effects, due to its topography and position, can very easily be traced. Its situation, lying as it does between the Golden Gate and the great San Joaquin Valley, gives it a medium climate, equally free from the fogs of the ocean and from the intense heat of the interior of California. Its mean annual temperature is 52° to 60°, except in the extreme eastern portion, where it is 60° to 68°. Its western range of hills protect it from the cold winds that sweep in from the Pacific during the summer months, while the interior bays serve to modify the heat of the summer sun. The winter frosts are light and of short duration; roses, geraniums and other plants bloom throughout the winter season.

The average annual rainfall is about 18 inches. There is ample precipitation for all purposes of agriculture, and during the past twenty-five years but two seasons have been known when there was a shortage; these were 1870–1, when but 7.01 inches fell, and 1876–7, when there was 7.99 inches. The heaviest season of rainfall in the same period was in 1867–8, when the rainfall was 30.93 inches.

In a report on the soils of Contra Costa County, based on samples taken from the Ygnacio Valley, Professor Hilgard says:

"This specimen represents the prominent soil features which lie around the landward northern and western base of Mount Diablo, bordered by outlying spurs of the Contra Costa range. Beyond and around is an uninterrupted body of splendid farming land. Mount Diablo Creek, heading on the mountain itself, drains the eastern portion, joining Walnut Creek just before its entrance into the tules of Suisun Bay, where the united streams assume the name of Pacheco Creek.

"The plains are dotted with large white oaks, which are especially thick near the borders of the streams. Close to the latter we generally find streaks of heavy, black, loamy earth; but farther away the soils are mostly lighter, both in color and texture, and more or less intermingled with gravel. Sometimes 'gravel ridges' of greater or less width indicate the course of ancient channels, and gravel evidently underlies a considerable portion of the plains, facilitating drainage. This is the more important, as the prevalent character of the soil is that of clay loams.

"Regarding the soil specimen under examination, while it is taken to the depth of 20 inches, wells dug in the neighborhood show no change of tint to the depth of 60 feet, showing an enormous accumulation of an evidently alluvial soil-mass.

"The sample sent is a brownish-gray loam, which, on wetting, softens quickly and without change of tint. The coarse portion consists mostly of flattened particles of hard shale and quartz, well rounded on the edges.

"The analysis of this soil resulted as follows:

Coarse materials	10.75	
Fine earth	80.25	
Insoluble matter	63.279	72.12
Soluble silica	8.842	
Potash		.77
Soda		.57
Lime		1.09
Magnesia		2.36
Br. oxide of manganese		.17
Peroxide of iron		4.91
Alumina		12.86
Phosphoric acid		.06
Sulphuric acid		.01
Carbonic acid		00.00
Water and organic matter		5.03
Total		100.56
Humus		1.073
Available inorganic		.806
Available phosphoric acid		.056
Hygroscopic moisture		9.056

"Chemically the soil shows a large supply of potash and of lime, and, as regards the latter, there can be no doubt that it is a general characteristic of the soils of Contra Costa County, since lime is abundant in the rocks on the flanks of Mount Diablo, as well as on the Contra Costa range. On the banks of Walnut Creek, the lower portion of the black loamy earth, just above the gravel that underlies at some 5 feet depth, is full of white gravel or lime concretions.

"The proportion of phosphoric acid in any case would be accounted above deficiency. But the determination of its solubility shows (under the head of 'available phosphoric acid') that practically all of it is in the available state. The soil has a good supply of humus, and therefore of nitrogen. Its power of absorbing moisture is high, and, with its depth, constitutes a safeguard of drought and hot winds.

"Its fruit product cannot fail to be both abundant in quantity and high in quality, and its best general adaptation would seem to lie in the direction of pears, apricots, and grapes."

The above analysis and description of soil relates particularly to the Ygnacio Valley, but the soils of the connecting valleys of Alhambra, Diablo, or Clayton, San Ramon, Briones, and Lafayette, are so similar in character, being the alluvial deposits of the same range of hills, that this analysis fairly represents all the above-named valleys.

The following analysis of soil from Burgundy, France, where is produced the most famous wines in the world, shows a wonderful similarity to that of Contra Costa:

Coarse material	9.75
Fine earth	81.25
Insoluble matter and soluble silica	78.21
Peroxide of iron	5.25
Magnesia	3.98
Alumina	7.47
Organic substances	5.39
	101.30

In depth, the soil generally throughout the county shows a remarkably continuity of rich alluvial deposits underlaid with limestone or clay. There is an occasional change to a kind of coarse sandy and gravelly heavy loam, of black or brown tint. It has great power for enduring drought, is easy to work, giving large returns with careful culture. Trees and vines seem almost to laugh in their growth as they push their roots down into this fat soil. The soil in the uplands is similar in character to that of the lowlands, and being drier, is for some purposes even better.

The farming lands in the eastern section of the county extend from Bay Point, a spur east of Mount Diablo, between the foothills and the San Joaquin River, to the county line, being 23 miles in length by from 3 to 6 in width, and embrace about 60,000 acres of arable land. The soil is, generally speaking, of a rich alluvial nature, and produces wheat, barley, alfalfa, fruit, and vines. To the northward, and between the uplands and the San Joaquin River, is a body of tule lands, embracing, in all, some 50,000 acres. Large sums have been expended in reclaiming these lands, which become marvelously productive, the soil being a rich deposit of sediment and decomposed vegetation. Thousands of acres are leased to Chinamen and Italian gardeners, who supply the San Francisco market with vegetables and small fruits.

In common with nearly all the coast counties, irrigation is not required in Contra Costa to insure crops. The abundant winter rainfall, the absence of the intense evaporating heat of the interior, and the moisture-laden breezes from the ocean, furnish abundant moisture for all forms of vegetable life without recourse to artificial irrigation.

The tourist, passing through the many beautiful valleys and over the rolling hills throughout Contra Costa County, is impressed with its similarity and general characteristics to the gentle slopes of sunny France. Scattered in all directions are numerous small vineyards and orchards that, with but little cultivation, produce the richest results. Beyond and around the northern and western base of Mount Diablo is an uninterrupted body of splendid farming land. There are plains dotted with white oaks, streams bordered with cottonwood and willows. The wild-oat hill lands, when exposed to the south, are nowhere equaled in the State for olive culture; and there is fruit land all over the county, and no irrigation is required. Among the numerous kinds produced, each embracing all of the superior varieties, are the pear, plum, prune, apricot, cherry, peach, quince, fig, apple, nectarine, pomegranate, olive, persimmon, orange, lemon, lime, date, strawberry, raspberry, gooseberry, blackberry, currant; and among nuts, the pecan, filbert, almond, walnut, and chestnut. Over 6,000 acres of land are devoted to these fruits in Contra Costa, and wherever fruit growing has been tried it has proven successful and remunerative.

The grape growers of Contra Costa state it is a fact that the phylloxera finds no lodgment in their vineyards. Of these there are at present 4,450 acres, of which 3,000 are wine grapes, the varieties of vines successfully growing ranging from Johannisberg Riesling, to the Black d'Ischid, and from the Petit Bouschet to the Golden Chasselas.

There has been a very large increase in the acreage of fruit in Contra Costa County the present year, amounting to about 25 per cent. The possibilities of fruit growing have but lately made themselves known, and a very large portion of the orchards in Contra Costa are not yet in bearing, and of those yielding fruit very few are yet in full bearing.

ACREAGE AND VARIETY OF FRUITS IN CONTRA COSTA COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	78	36	114	13
Apricot	235	152	387	37
Cherry	133	73	206	38
Fig	24	15	39	20
Olive		160	160	145
Peach	214	213	427	109
Prune	338	316	654	83
Pear	304	295	599	48
Quince	41	37	78	21
Persimmon	2		2	
Lemon	2	1	3	1
Orange	4	3	7	2
Nuts—Almond	253	224	477	216
Walnut		50	50	8
Other nuts	10		10	
Raisins	216		216	
Table grapes	425		425	
Small fruits	68		68	
Totals	2,347	1,575	3,922	741

This would give about 2,700 acres in trees. Besides this there are 4,486 acres in grapes, as follows:

	Acres.
For table	425
For raisins	216
For wine	3,845

It will be seen from the above that prunes and pears are the leading fruits of this county, while close upon them come almonds. The superior fitness of the soils of Contra Costa for almonds has been demonstrated, and Judge Pope, of Danville, has one orchard of 150 acres planted to this nut. Olives also do well, and Mr. Busby, at Concord, has an olive orchard of 80 acres. Other fruits do equally well, and are gradually changing the face of Contra Costa from a wheat field to an orchard.

The greater part of the fruit product of this county is marketed green, being boxed and crated. Pears and apples are packed in 40-pound boxes; peaches, apricots, plums, etc., in 20-pound boxes, and cherries in 10-pound boxes. These are shipped principally to San Francisco, although a large portion of the fruit product of the county finds its way to Oregon, Washington, and the East. Prices ranged at from 1 to 3 cents per pound. The present season's outlook is good. The crop will not reach the usual average, many varieties being short, but the prevailing prices will nearly compensate for any shortage in the crop.

The principal fruit sections of Contra Costa are Walnut Creek, the region from San Ramon Valley to Martinez, Lafayette, Orinda Park, and Diablo Valley. The prevailing soil in all these sections is a sandy loam, rich in vegetable mold.

DEL NORTE COUNTY.

Del Norte County lies in the northwesterly corner of California, and is bounded on the north by Oregon, on the east by Siskiyou, on the south by Humboldt, and on the west by the Pacific Ocean. It has an area of 1,546 square miles, or 989,000 acres. The eastern portion of the county is mountainous, but in the southern and western parts there is much good agricultural and grazing land. The area suitable to cultivation is confined to the Smith River Valley and a belt along the ocean near Crescent City. A large portion of this county is covered by vast redwood forests, and these extend in an almost unbroken belt from the southern boundary to the Oregon line on the north, with an average width of 40 miles. This land when cleared is very fertile, but the labor of removing the immense redwood stumps and clearing off the partly decomposed logs which cumber the ground is so great as to preclude effort in that direction.

The entire area is practically a succession of mountain ranges broken into narrow valleys. That portion of the Coast Range which traverses the eastern part reaches an altitude of 5,000 to 6,000 feet. Snow remains on the summit of these mountains until late in the summer, and they are rugged and precipitous in the extreme.

Del Norte has an ocean frontage of about 35 miles. The Klamath River is a large stream. The greater part of its course is through this county, which it leaves on the southern boundary entering Humboldt, then reënters Del Norte and empties into the Pacific. Smith River is also a stream of considerable magnitude. Besides these there are a large number of creeks tributary to them, making of Del Norte one of the best watered counties of California.

Del Norte lies within the moist belt, and the precipitation here is much heavier than in most of the counties of California. The rainfall at Crescent City in 1891 was 81.50 inches, and records kept for a number of years show the following monthly averages at the principal points in the county:

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Camp Lincoln	16.87	6.68	11.20	7.16	0.92	2.17	0.25	0.03	0.30	1.82	9.48	15.58
Crescent City	16.54	9.91	7.53	10.39	3.38	0.96	0.26	0.02	2.06	10.98	4.95	14.13
Fort Terwah	7.81	10.52	5.00	6.07	3.63	0.62	1.94	0.47	3.05	7.43	8.67	13.01

The soil in the valleys and foothills of Del Norte is very fertile, that of the valleys being devoted chiefly to dairying, which is here the principal industry. In the foothills some excellent fruit is grown, but in limited quantities, and principally for home consumption. An occasional orchard of apples, pears, and peaches proves that the soil and climate here are well adapted to horticulture, and gives promise of the extension of this branch of industry whenever easy means of reaching the markets shall be had. In Smith River Valley some very excellent apples are produced, and pears, plums, and cherries thrive here as well as in any part of California.

The chief industries of the county are dairying, lumbering, and to some extent mining, and comparatively little land is under cultivation, the average being but 7 acres to the square mile.

Of fruits grown here apples form the staple, and these do well, possessing good keeping qualities and being finely flavored.

ACREAGE AND VARIETY OF FRUITS IN DEL NORTE COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	98	27	125	10
Apricot	½	½	1	--------
Peach	4	3	7	1
Prune	2	--------	2	--------
Pear	5	2	7	1
Plum	4	4	8	2
Totals	113½	36½	150	14

While Del Norte produces a large quantity of apples, the bulk of her product is consumed locally, but a small portion of it finding an outside market, and this finds its way to San Francisco.

The soil and climate of Del Norte seem especially adapted to the growth of apples. The former is generally a deep, black loam, very rich and easily worked, and the climate is marked by great humidity, and but little extreme hot weather. While some small family orchards have been bearing in Del Norte for many years past, some have been planted as early as 1850–53, and are still vigorous. Fruit growing as a business has never obtained a foothold in the county.

The fruit crop this year is very poor over the whole county, and in some parts will be almost a failure. At Elk Valley it is lighter than has been known for twenty years.

EL DORADO COUNTY.

El Dorado County lies on the eastern line of the State, and north of the center, and is bounded on the east by the State of Nevada, north by Placer County, west by Sacramento County, and south by Alpine and Amador Counties. It has a length of 75 miles from east to west, and an average breadth from north to south of 35 miles. Its area is 1,890 square miles, or 1,150,000 acres. Within this area are embraced most of the varied beauties and advantages which are to be found in the most favored portions of this highly favored State. Along her western borders stretches a belt of prairie land but slightly elevated above the level of the sea, where in the primitive days waved vast fields of indigenous wild oats, furnishing luxuriant free pasturage to the cattle, sheep, and horses of the pioneers. This wild grain, those most beautiful pastures, have, together with freedom of pasturage, largely disappeared before the march of civilization, but wild oats are still quite abundant, and they, with other nutritious grasses, furnish winter sustenance to great herds of cattle and sheep, which, during the summer, are herded on the succulent ranges of the Sierra Nevada summit region. This prairie belt, and the contiguous lower foothill region, are peculiarly adapted to the growth of fruits—the olive, the fig, and the apricot. Thence, by gradual ascent, is reached a stretch of undulating country, rolling hills, and narrow valleys, covered in their native state with white oak timber, or with groves of manzanita, chaparral, and buckeye. Here is found the gravelly red soil of the foothill region proper, where the choicest fruit of the vine reaches perfection. Here, too, the peach, the plum, and apricot attain a size, color, texture, and lusciousness which give them incontestable rank as among the finest fruits of their kind.

Thence, still by a gradual ascent, is reached the upper foothill region, with an altitude of from 1,500 to 2,500 feet. This region embraces fully two thirds of the territorial area of El Dorado County. Here the county is heavily timbered with black oak, live oak, spruce, hemlock, fir, cedar, and many species of pine, while the banks of the streams are fringed with maple, alder, dogwood, and madrona, and the air made redolent with the perfume of wild nutmeg and bay. Here the cereals produce good, remunerative crops, while potatoes, beets, pumpkins, Indian corn, and all manner of garden vegetables attain perfection, both in size and quality. Clover yields an enormous and perpetual crop. The apple, pear, plum, nectarine, and all orchard products of the temperate zone attain excellent size, color, flavor, and keeping qualities.

Above the foothills rises the mountain or summit region, in whose highest altitude is found perpetual snow. Here the rivers take their rise, the lakes are fed, and the system of canals receive their waters. Here, too, there is a magnificent forest, one of the grandest on the American continent, embracing thousands of acres of majestic sugar-pine trees, measuring 10 to 15 feet across, and rising frequently to a height of 120 to 150 feet before a limb is reached.

The climate of El Dorado varies with its physical features. In the western portion the summers are hot, the thermometer having a range of 95° to 110°. The nights, however, are usually cool. The winters are characterized with the usual rainy days, interspersed with warm and pleasant weather, and with occasional frosty nights. In the vicinity of Placerville and Georgetown there are sometimes light falls of snow, seldom exceeding a few inches, and rarely remaining on the ground over twenty-four hours. In the eastern portion, the more elevated, including the higher foothills and the mountains, the summers are not so hot and the winters much more severe, with heavy snowfalls and sharp frosts.

From a series of observations covering a period of ten years, kept at Georgetown and Placerville, the following averages are given:

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Georgetown ..	11.000	8.520	8.776	7.201	2.290	.814	.059	.001	.457	3.465	6.185	9.937
Placerville....	7.098	6.051	5.790	7.694	1.879	.841	.000	.004	.708	2.186	3.749	8.668

It will be seen from this that the rainy season extends from October to May, and in many seasons little if any rain falls in either of those two months.

Like most of the foothill counties, the soil in El Dorado varies from the black alluvium in the lower regions to the gravelly red soil of the foothills. The lower levels have been filled with the diluvial detritus of the mountains. Occasional streaks of adobe are found. In the mountains are numerous little valleys, the soil of which is formed from the wash of the surrounding hills. The various soils are usually very rich, their fertility being evinced by the large returns from both cereal and pomological crops.

The California Water and Mining Company owns and controls a system of canals, comprising over 250 miles in length, covering every portion of the Georgetown Divide from Loon Lake, 40 miles east of Georgetown by wagon road, to Wild Goose Flat, a point on the American River nearly opposite Loomis, Placer County, and from Chile Bar, on the South Fork of the American, distant only 3 miles from Placerville, to Spanish Dry Diggings, on the Middle Fork. The principal source of water supply is a series of groups of lakes lying on the summit of the Sierra, at an altitude of 6,000 feet, fed by melting snows. In addition, the company takes water from the South Fork and Pilot Creek, both branches of the Middle Fork of the American; also from Rock Creek, Rock Cañon, etc. This county, generally, may claim to be among the best irrigated in the State. The waters have all been appropriated, subject to well defined and settled rules of legal regulation, for public use and beneficial purposes. Conflicts of interests on the irrigation question are not dreaded.

Besides the California Water Company on the Georgetown Divide, there is the El Dorado Water and Deep Gravel Mining Company, and the Park Canal and Mining Company, respectively, on the two other distinct main ridges running east and west, as means of supply.

Following is a list of the water companies of El Dorado County, with the miles of canals owned by them and their assessed valuation:

Name.	Miles.	Value.
Plymouth Consolidated Gold Mining Co.—main branch	35	$150,000 00
Plymouth Consolidated Gold Mining Co.—branches		4,500 00
California Water and Mining Co.—main canal	30	21,000 00
California Water and Mining Co.—branches	211	9,740 00
El Dorado Water and Deep Gravel Mining Co.	30	30,000 00
El Dorado Water and Deep Gravel Mining Co.—branches	54	28,000 00
National Water and Mining Co.	7	1,400 00
Sundry minor ditches, mining		15,000 00
Sundry minor ditches, irrigating		9,845 00
Total		$269,485 00

From the above table it will be seen that the greater part of the canals built in El Dorado County have been constructed for mining purposes. El Dorado, in the early part of our existence as a State, was the leading mining county. It was here that gold was first discovered, and the prospects of enormous returns in gold for the outlay led to the building of very costly waterworks. As gold mining has declined and horticulture has advanced these canals have found a new use, and to-day are of as much importance for irrigating purposes as for mining, for they are still used in the latter industry. While this is true, however, horticulture is growing so rapidly while mining is declining, that the growing importance of these water systems is in the direction of horticulture, and they may be classed as irrigating canals.

El Dorado County is very rapidly changing her character from a mining to a horticultural county, and some of the finest fruits in the State are produced here. Her variations in altitude, rising from the Sacramento plain 40 feet above sea-level to the high Sierra region, with an elevation of 8,000 to 10,000 feet, with the accompanying variation in climate from almost perpetual summer to perpetual winter, makes possible the culture of the widest range of fruits, and most of them flourish in El Dorado County. The peach is the favorite, and following come the Bartlett pears, prunes, cherries, and other deciduous fruits. Apples do well in the higher altitudes up to 3,000 feet, and at Grizzly Flat, Mendon, and other points north on the range, very excellent fruit of the more hardy varieties are grown. In the lower foothills peaches, prunes, and the stone fruits generally prevail, and while little attention is paid to the small fruits, berries and currants, these fruits grow well and bear heavily wherever cultivated.

The principal fruit section of El Dorado is Coloma, where over one half of the entire output of the county is produced. Following come Placerville, chiefly in pears and apples; Granite Hill and Mud Springs, peaches, plums, and pears; Grizzly Flat, Mendon, and Sportsman's Halt, apples.

ACREAGE AND VARIETY OF FRUITS IN EL DORADO COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	248	7	255	11
Apricot	16	13	29	4
Cherry	29	10	39	1
Fig	14	10	24	----------
Olive	3	13	16	1
Peach	1,153	185	1,338	103
Prune	202	77	279	27
Pear	36	160	196	----------
Plum	32	9	41	7
Lemon	1	3	4	2
Orange	4	2	6	3
Nuts—Almond	13	8	21	7
Walnut	3	5	8	3
Raisins	79	----------	79	----------
Table grapes	190	----------	190	----------
Totals	2,023	502	2,525	169

Experiments made with citrus fruits, especially the more hardy Japanese varieties, and with the olive, have been very successful, and, like the other foothill counties, El Dorado gives promise of some day making her mark in the culture of the olive, which fruit seems to do wonderfully well here.

The largest single body of land in fruit in the county is that owned by the El Dorado Fruit Company, at Diamond Springs, who have 400 acres of fruit in one orchard, chiefly peaches.

The crop of the present season has been short, ranging as follows:

Peaches	¾ crop.	Pears	⅔ crop.
Cherries	¾ crop.	Prunes	⅓ crop.
Plums	½ crop.	Apples	⅔ crop.

There are two packing houses located at Placerville—one a branch of Cook, Langley & Co., established this season, the other a branch of Barnett Bros., established in 1891. They are handling a very large quantity of fruit, and keep from twenty to thirty people employed. Barnett Bros. shipped 40 cars of green fruit from here last season, and it is estimated that the two houses will ship this year over 100 carloads of green fruit from El Dorado County.

The prices paid at the packing houses this season were:

Peaches per 20-lb. box	50c. to 60c.
Bartlett pears per 40-lb. box	$1 30
Plums per 25-lb. box	75c. to 80c.

These prices were for acceptable fruit delivered at the packing house. The larger part of the fruit grown here is marketed green, being shipped principally to the East in refrigerator cars. Some little fruit finds its way to San Francisco, and some, from 15 to 20 per cent of the total, is dried and sacked. This is dried by the individual growers, and finds its way to Stockton and Sacramento.

FRESNO COUNTY.

Fresno County is one of the largest counties in the State, its area being 8,093 square miles, or 5,600,000 acres. It is located in the heart of the San Joaquin Valley, and is bounded on the north by Merced and Mariposa, on the west by San Benito and Monterey, on the south by Tulare, and on the east by Mono and Inyo Counties. On its eastern boundary line is the summit of the Sierra Nevada, and on the west the crown of the Coast Range, a distance of 140 miles. On its southern boundary runs Kings River, from which it extends north about 60 miles, comprising within itself all the elements of a great State, not only of superficial area, but of natural resources. In no equal area upon the earth, outside of California, can the same physical conditions be found, ranging, as it does, from the field of never-dying snow and ice on the summits of the Sierra Nevada, to the perennial summer of the beautiful and prolific valley 15,000 feet below, so perfectly sheltered by the two ranges that form its eastern and western boundaries. Here it is but a step from the palms to the glaciers, from the Tropics to the Arctic Circle, so far as change of climate is concerned.

Of the vast area comprised in Fresno County, the central part is a great valley 60 miles square, containing nearly 2,500,000 acres of nearly level land. The foothill and mountain section on the east of the valley is about 45 miles wide, and that on the west of the valley about 20 miles in width. The mountains which form the boundary of the valley on the east and the west comprise considerable barren territory. The main valley, however, has a rich soil, varying greatly in quality, consisting of red land, adobe, white ash, dark, sandy loam, and granite.

The valley was once a treeless waste, save along the watercourses, but the decomposed granite or detritus brought down from the mountains in ages past enriched the soil, and irrigation and cultivation have changed the original appearance, and transformed it into the richest fruit and orchard land. In this great central basin, then, there are over 3,000,000 acres. Of this not more than one third is under cultivation, and one half of this only as pasturage or for grain. The soil of this basin is almost uniformly a rich sandy or alluvial loam, quite porous, and usually highly impregnated with phosphates and vegetable mold. In some portions considerable alkali is found in patches, but these are neither extensive in comparison with the vast area of fertile land, nor numerous.

The climate of Fresno differs little from the other parts of the San

Joaquin Valley. The general climatic conditions are favorable to industrial pursuits, there being but few days in the year when outdoor labors may not be prosecuted. The snow belt is far above the valley, and while the effects of a vigorous winter are never felt, there is still enough of cold to give a bracing reaction to the system.

The nutritious fruits and grains of the temperate belt, as well as the rich products of semi-tropical plants, mature here side by side and ripen in due time, and fruits, meats, and grain retain their freshness and sweetness for a season seldom equaled in the extreme heat which at times prevails in midsummer. During the warm season the thermometer frequently goes as high as 100°, and even much higher, but the heat is never oppressive, and one does not suffer as in Eastern States at 80°. This is due to the extreme dryness and purity of the atmosphere—the absence of humidity. Field work is continued throughout the year, people working at harvesting all day in the heat of summer without inconvenience, and no sunstroke has ever occurred in the county. The air is so dry that the perspiration is quickly evaporated, keeping the body cool during the hottest hours of the day. The nights are always cool.

The rainy season begins in November and ends in April. This season is very much like April and May in the East, showers rarely extending over three days.

Following is the mean monthly temperature, as furnished by the Signal Service Officer, together with the minimum and maximum registrations for the same period, the elevation of the thermometer being 77.5 feet above the ground:

TEMPERATURE AT FRESNO, FOR THE TWELVE MONTHS ENDING MAY, 1892.

Date.	Maximum.	Minimum.	Mean.
1891—June	112	50	73.0
July	114	51	83.6
August	112	56	83.6
September	104	51	74.6
October	94	40	67.0
November	81	34	56.2
December	66	27	43.9
1892—January	69	30	48.5
February	70	34	53.2
March	78	36	55.6
April	80	36	57.6
May	100	41	----
1891	114	28	63.0
1890	111	24	62.6
1889	112	27	64.3
1888	111	20	64.4

The following table gives the rainfall for the season of 1891-92, by months, in comparison with the total for previous years:

Date.	Total Amount.	Greatest Amount in any 24 Consecutive Hours.	
		Amount.	Date.
1890—December	2.30	1.21	24th.
1891—January	.88	.54	5th.
February	2.24	.50	21st.
March	.81	.26	1st.
April	.49	.29	6th.
May	.03	.02	--------
June	.02	.20	--------
July	.00	.00	--------
August	.00	.27	--------
September	.27	.27	--------
October	.00	--------	--------
November	.21	--------	--------
December	3.99	--------	--------
1892—January	.48	--------	--------
February	1.00	--------	--------
March	1.69	--------	--------
April	.79	--------	--------
May	1.44	--------	--------
1891	2.25	--------	--------
1890	9.93	--------	--------
1889	12.27	--------	--------
1888	8.76	--------	--------

The total for the past season, from September to May, inclusive, was 9.87 inches.

Irrigation has been practiced for the past twenty years in Fresno, and there are now 1,000 miles of public irrigating canals in the valley, coursing from east to west in many divergent lines, and covering, or capable of covering, with sufficient water for cultivating, not less than 500,000 acres of land. The great body of this land has been found particularly adapted to orchards and vineyards.

There are four irrigating districts, organized under the Irrigation Act, lying wholly or partly in Fresno County. These are the Madera District, wholly in Fresno, the Alta District, the Sunset District, and the Selma District, all of which lie partly in Fresno and partly in Tulare Counties. Of these a further account is given below.

A special peculiarity of much of the soil of this county is its natural adaptability to sub-irrigation. The underlying water, fifteen years ago, was 40 or 50 feet below the surface. Now, from the result of seepage, it can be reached at from 5 to 15 feet. This sub-irrigation is not stagnant water in the soil; it has its current underground no less than the flow of the ditches on the top, although of course not so rapid, and it thus increases each year, pressing out upon the plains and filling the depth of the soil far in advance of the irrigating canals. This valley has an almost uniform slope, from the foothills to its center, of from 5 to 6 feet to the 100 feet, forming a most perfect trend for waterways. It is this slope also that aids to press the sub-irrigation down into the center of the valley and its broad extent. This gentle, gradual slope answers also another important end. It might be feared that this gradual filling up of the soil from beneath would continually come so near the surface as to make the whole region a vast swamp; but this is prevented by the natural drainage which this slope secures. The

waters of Kings River, brought upon these plains from the foothills of the Sierra, are in a large part in the form of sub-irrigation, pressing through many miles of underground flow, to reach again their old channel in the center of the valley.

IRRIGATION WORKS IN FRESNO COUNTY.

Name.	Miles.	Value.
Fresno Flume and Irrigation Co.	30	$30,000 00
Enterprise Canal and Irrigation Co.	30	80,000 00
Emigrant Ditch Co.	15	20,000 00
Fresno Canal and Irrigation Co.	200	1,250,000 00
California Pastoral and Irrigating Co.	21	25,000 00
San Joaquin and Kings River Canal Co.	20	40,000 00
Madera Flume and Trading Co.	52¼	30,000 00
Totals	368¼	$1,475,000 00

The Fresno Flume and Irrigation Company derives it water from the head of the San Joaquin River. It has now under consideration the construction of a reservoir which will cover 1,200 acres of land and have a storage capacity of 1,338,132,000 cubic feet. When this is completed it will put from 80,000 to 100,000 acres under water. Water rights sell at $10 per acre, with a yearly rental of $1 per acre. The work of construction on this reservoir was begun in July of the present year, under the superintendence of C. B. Shaver, and J. M. Graham, engineer.

In addition to the 30 miles of canal owned by the Enterprise Canal and Irrigation Company, it controls many miles of side ditches. Its source of supply is Kings River, from which it takes 100 cubic feet per second. The shares are owned by some thirty stockholders. The Emigrant Ditch Company is composed of twenty shareholders, and the water is divided among them according to the number of shares owned. The company claims a flow of 196 cubic feet per second. A flow of one cubic foot is considered sufficient for 160 acres of land. At this rate, therefore, this company has sufficient water to irrigate 31,360 acres.

The Fresno Canal and Irrigation Company was incorporated February 16, 1871. It diverts from Kings River 1,000 cubic feet of water per second, and covers 160,000 acres of land. This is supplied to the consumer at 62½ cents per acre per annum.

Of late years horticulture has made rapid strides in Fresno County, and is fast becoming the principal industry of the people. Raisin growing has received by far the greater amount of attention, but of late other fruits have forced their way to the front, and are now dividing attention with the favorite fruit, until to-day orchards of all kinds of fruit can be found in the county, and all seem to do well and prove remarkably productive. While it is true that most fruits thrive here, it is also true that some varieties are better adapted to the peculiarities of soil and climate which exist here than are others.

Among the most profitable orchard fruits may be named the peach and nectarine, and the apricot in some localities. These are of very rapid and healthy growth, coming into bearing in the third and fourth years, and with the assistance of the summer climate for sun-drying, give large returns from the crop. Apricots and peaches both do well. Pears and plums grow and bear well.

The result of prune culture has not been sufficiently promising to regard it as a hopeful industry for the future. There are vast areas of arable lands in the foothills, rich and choice valleys, where almost all orchard fruits that require cool, moist atmosphere can be grown.

Olive culture is yet in its infancy in this county. There are a few trees six or more years old, but these have grown well and bear heavily. Within the last two or three years considerable acreage has been set to this fruit, and the prospect for future success is good.

The same is true of fig culture. The black California fig is an old habitant of this county, and has been a sturdy grower and most prolific bearer. This can be seen in the older foothill towns of the county. Within a few years attention has been somewhat turned to fig culture, and many acres have been set out. So far the result is very promising. The variety most in favor is the White Adriatic. Large shipments have been made, with the most satisfactory results.

Very little attention has as yet been given to the culture of citrus fruits. A few orange orchards in the foothill regions of this county, fifteen or eighteen years of age, show excellent results. The fruit ripens very early. Within the next few years much more attention will be given to orange culture, and immense orchards will be planted in the thermal belt.

The cultivation of the fruits so far referred to may be called only the side issues in Fresno County fruit culture. This valley, under the "reign of water," is remarkably adapted to the culture of grapes of all varieties. Thus the planting of vineyards became the leading industry. At first this was largely confined to the culture of wine grapes, and several of the largest vineyards and wineries in the State have become established. The yearly output of wine and brandy has been, during the last few years, in the region of 2,500,00 to 3,000,000 gallons. The heavy-bearing quality of wine grapes is here phenomenal, reaching in some of the best vineyards 12 to 14 tons to the acre.

But in the planting of vines attention was soon turned to the Muscat, or raisin grape. Early experiments proved that the rich, alluvial soil was eminently fitted to the growth of this grape, and that the climate was equally suited to cheap and easy curing of the fruit as those foreign countries which produce the delicious raisins of the world's commerce. This industry had many obstacles to overcome in the beginning; many predictions of failure, and many sneers over the early product. The raisin output was about 4,000 20-pound boxes ten years ago, and it must be confessed was, upon the whole, not an article likely to win renown in competition with the well-established foreign brands. Not a few raisin-grape growers were so discouraged as to contemplate cutting out their Muscat vines. The increase of product has gone forward from 4,000 20-pound boxes in 1882 to a product of more than 1,000,000 boxes in 1891. At the present rate of planting it will only be four or five years until at least between 2,000,000 and 3,000,000 boxes will be put up in the Fresno district.

The Muscat vine is a rank feeder, and finds abundant food in the multitudes of old sloughs and extinct waterways that course through this valley. It loves abundant moisture, even up to the ripening of its fruit; this it finds in the prevailing sub-irrigation, and in many cases necessity for surface irrigation is obviated. A few of the best vineyards have never had any surface irrigation. This permanent underground moisture to draw from makes it possible to harvest a second crop of grapes, in quantity and quality nearly equal to the first.

California is destined to become a region of specialties, and while every district may be able to raise, with more or less success, all the products of others, every district can raise some one commodity better and with larger profits than any other district.

Fresno County so far, in its history of raisin culture, has been the phenomenon of the Pacific Slope. The magnitude of its possibilities in this line can scarcely be imagined to-day.

Up to the season of 1891 all fruit raised in the county was shipped green or dried. That season the industry of canning was added. The Fresno Canning Company was organized last spring, local fruit growers associating themselves in the concern with the old San Francisco house of A. Lusk & Co.

The season proved a very successful one, despite the fact that the apricot crop was somewhat short in the county.

The total pack for the season amounted to 52,069 cases, each case holding twenty-four cans, making a total of 1,219,658 cans of fruit. The amount of case goods is divided into the following varieties:

Cases of apricots	4,315
Cases of Bartlett pears	9,210
Cases of peaches	31,319
Cases of plums	3,110
Cases of grapes	4,115

This means the consumption of 115 tons of apricots, 290 tons of Bartlett pears, 1,550 tons of peaches, 70 tons of plums, and 120 tons of grapes, making a total of 2,145 tons, or 4,290,000 pounds of fruit.

The company paid out for fruit alone during the season the sum of	$53,615 00
For labor in preparing the fruit, etc.	41,034 19
For cases	6,100 13
For sugar used in the fruit	17,913 10
For cans	41,609 81
For coal, solder, labels, etc.	11,200 00
Making a grand total of	$171,472 32

Besides the handling of this immense amount of fruit, the cannery company shipped about 40 cars of green peaches to San Francisco. Financially the company was equally successful. Its pack was not excelled in the State, and has made a great reputation for Fresno fruit all over this country and Europe, the bulk of the output having been shipped to the Old World.

As has been stated, Fresno is essentially a raisin county, and here are produced the greater part of the raisins shipped from the State. Following these in order of importance are peaches, pears, nectarines, apricots, prunes, and plums. These fruits find a market in the East, where they are shipped green or dried. The green fruit is packed in boxes and crates, and the dried in boxes and sacks. A very large part of the raisin crop is now shipped in sacks to the East, where it is boxed by the jobbers.

The yield for the present season is rather below the average. The first crop of raisins was short about 25 per cent, apricots were light, plums and prunes fair, peaches, pears, and nectarines average. The increased prices of the present season over those paid last year have much more than compensated for the shortage, as will be seen from the following statement of average prices paid last season and this for dried fruits:

	1891.	1892.
Raisins	3½ cents.	4½ cents.
Peaches	6 cents.	12½ to 13 cents.
Pears	5 cents.	8 to 12 cents.
Apricots	5 cents.	12 to 16 cents.

Fresno, Selma, Fowler, and Madera are the principal fruit centers of Fresno County, and the increased acreage of fruit planted this year will exceed 6,000 acres. This is very largely in raisin grapes, although more attention is being given to tree fruit in Fresno at present than ever before.

ACREAGE AND VARIETY OF FRUITS IN FRESNO COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	38	147	185	96
Apricot	448	112	560	68
Cherry	4	3	7	2
Fig	320	131	451	98
Olive	70	50	120	30
Peach	1,214	844	2,058	615
Nectarine	81	68	159	40
Prune	640	938	1,578	446
Pear	422	212	634	82
Plum	12	13	25	7
Lemon	1	2	3	1
Orange	9	124	133	47
Nuts—Almond	5	21	26	13
Walnut	10	60	70	24
Raisins	35,900	8,000	43,900	5,000
Totals	39,174	10,725	49,889	6,572

GLENN COUNTY.

Glenn County is the youngest in the sisterhood of California counties, having been separated from Colusa by Act of the Legislature of 1891. Its area is 130,000 acres. It is bounded on the south by its parent county, Colusa, on the east by Butte, on the north by Tehama, and on the west by Trinity and Mendocino. It is one of the Sacramento Valley counties, and is located on the eastern slope of the Coast Range, on the western side of the valley, and extends from the summit of the Coast Range to the Sacramento River, these forming its natural eastern and western boundaries.

The eastern portion of the county consists of level valley lands which change into rolling hills on the west, becoming more extensive and precipitous in the foothills of the Coast Range until they merge into the mountains.

Willows, which is the county seat, has a beautiful location in a gentle slope of the Sacramento Valley. No finer view can be presented. With its productive fields looking toward Mount Shasta to the north, the Sierra to the east, and the foothills of the valley and the Coast Range to the west, a land of loveliness and grandeur is presented to the eye.

What has been said of the climate of Colusa holds good of Glenn, there being but little difference between the two, as will be seen by the table of precipitation at Willows and points in Colusa County published under the latter head.

The soil is generally of a fertile character, and ranges from a rich black loam in the bottom lands along the river to a more gravelly soil in the higher and foothill regions. The rich clay lands of the western foothills has proved itself well adapted to fruit growing, and some excellent results have been obtained. The hills surrounding the small valleys present any variety of surface, and are adapted to the culture of a great variety of vegetable products.

For irrigation purposes Glenn is well supplied with water. On the east is the Sacramento River, with its swift current of clear, crystal water; it runs the whole length of the county from north to south. Stony Creek flows north and then southeasterly into the Sacramento River. This creek has several tributaries, and the water is used for irrigation by a number of settlers. Several irrigation districts have been formed. In the Central District water is diverted from the Sacramento River, near the mouth of Stony Creek, and conveyed in an immense canal southwesterly to Willows. There the canal crosses the railroad and pursues a southerly course along the foothills to a point near Arbuckle, where it will terminate for the present. Another irrigation district will furnish water for 40,000 acres near Orland. A number of streams of smaller size also rise in the foothills and flow into the valley, where they are lost.

Glenn has not as yet attained any great reputation as a fruit county, her great staple industry being the production of wheat. Enough has been done, however, to show that this county is well adapted to the growth of a very long line of horticultural products. Prunes make a rapid growth, bear early and yield heavily; peaches and apricots do equally well. Apples and pears, on soil in locations suited to their requirements, yield abundantly. Citrus fruits also do well where they have been tried, while some of the finest raisins in the State have been grown here. Nuts, also, seem to be a profitable crop, and some very excellent walnuts and almonds are produced here. In the hills and Stony Creek country large areas have been planted to fruit and vines, and with most gratifying results. It will be but a short time before Glenn will take her place among the horticultural counties of the State, and maintain it by the excellence of her products.

The chief fruit products of Glenn are peaches, apricots, and prunes, but of these but little is yet shipped outside of the county, the orchards being yet too young to bear in any great amount. The sections which seem to be best adapted to fruit are Fruto, Orland, Elk Creek, and Princeton. Orland is the citrus section of the county, and some young orange trees planted here have made a very promising growth. At Fruto prunes, peaches, and apricots are the prevailing fruits, and the soil and climate seem especially adapted to their growth.

ACREAGE AND VARIETY OF FRUITS IN GLENN COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	32	77	109	37
Apricot	117	110	227	103
Cherry	7	16	23	5
Fig	13	16	29	3
Olive	4	5	9	2
Peach	200	186	386	120
Prune	50	201	251	92
Pear	60	63	123	20
Plum	7	3	10	1
Orange	12	11	23	7
Nuts—Almond	70	118	188	83
Walnut	30	50	80	20
Raisins	900		900	
Table grapes	50		50	
Totals	1,552	856	2,408	493

HUMBOLDT COUNTY.

Humboldt County extends from the 40th parallel of latitude, which is its southern limit, to about midway between the 41st and the 42d parallels, where it adjoins Del Norte County, and is with this one exception the most northerly county of California. Its boundaries are Del Norte on the north, Siskiyou on the northeast, Trinity on the east, Mendocino on the south, and the Pacific Ocean on the west, where the sinuosities of the coast-line extend some 175 miles. From north to south the county extends 108 miles, while in width it averages about 40 miles. It contains 3,590 square miles, or 2,297,600 acres of land. A good idea of its size may be had when it is stated that it is over one half the size of Massachusetts, and somewhat less than the State of Connecticut.

This area may be subdivided into the following classes: Timber land, 938,000 acres; agricultural land, 450,000 acres; grazing land, 500,000 acres; marsh land, 31,285 acres; mineral land, 125,000 acres, and unclassified lands, 253,315 acres.

The topographical features of Humboldt are varied and picturesque. The surface is extremely rugged, numerous spurs of the Coast Range intersecting the county in all directions, rising in many places to absolute grandeur.

Besides a number of smaller streams, the county is drained by two rivers of importance. Entering at the extreme northeastern corner, the Klamath traverses it for about 30 miles in a southwesterly direction, and there being joined by the Trinity, flows nortwesterly 45 miles, and empties its waters into the Pacific Ocean just north of the county line. Entering the county at its eastern line, the Trinity flows about 30 miles and joins the Klamath, a river carrying a vast volume of water to the ocean. Among the minor streams are Mattole, Bear, Elk, Redwood, Little, and Mad Rivers, and Redwood Creek. Second to the Klamath is Eel River, navigable for small craft, such as scows, flat-boats, and small steamers. All these flow in a northwesterly direction, and are separated from each other by a high hill country.

Of the topography of the Klamath River country, the Humboldt "Standard" gives the following description:

"The Klamath is the second largest river in the State. This stream reverses the physical conditions which characterize the Sacramento. The latter stream takes its rise amidst the alpine surroundings of the Sierra Nevada, flowing from its snowy eyrie with great force and volume. Below Shasta it meanders through valleys of extensive width, great depth of soil, and marvelous fertility to San Pablo Bay; whereas, the Klamath takes its rise amidst a vast expanse of levels, consisting of lakes, swamps, and tules—all this lacustrine region being remarkably fertile when reclaimed—until, entering the rocky embrasure to the Coast Range, it rushes on through these defiles tumultuously to the ocean. On the south this condition is again reversed, through its tributary, the Trinity, this river flowing from the rocky defiles almost from the foot of Mount Shasta. If we could be suspended over the river in a balloon, we would find the outline of the stream fan-shaped, with its periphery extended between Shasta County in our State and Lake County in Oregon, 300 miles in width, running down to a point at Weitchpec, using the river from that point to the ocean as a handle. Its tributaries, the Trinity, Salmon, and Scott Rivers, all flowing from the eastward, pour their annual floods into the parent stream, and, owing to the great elevation of their surrounding mountains, which reach a height of 6,000 and 8,000 feet, covered through the winter months to great depths with snow, which, under the hot sun and heated air, pour forth their aqueous tribute till the month of April, when these floods are usually at their height, these annual floods surpassing anything in the State.

"It drains the waters of seven counties: Humboldt, Del Norte, Trinity, Shasta, and Siskiyou, in California, and Jackson and Lake Counties, in Oregon. Its course, from its source, is west-southwest from Klamath Lake, and afterwards southwest, making a sharp bend at Weitchpec, north-northwest to the Pacific Ocean, where it is a mile wide at the mouth. The length of the river proper is about 250 miles; including the large tributaries, about 1,000 miles. It enters the ocean about 41° 30′ north latitude, and the estuary can be easily distinguished for many miles at sea. Nowhere in the State can be found such testimony of that ancient geological period when this continent was submerged. This channel has been cut through by the silent and persistent erosion of the waters, until it has acquired a depth of 400 or 500 feet. In many places this channel was miles in width, notably at Orleans Bar, where it must have been many miles."

On the coast the temperature of Humboldt County is uniformly cool and pleasant, ranging from about 56° in the summer, to 45° in the winter. The heat increases after leaving the coast-line, the thermometer ranging from 52° to 100°, according to season. Freezing point is but rarely reached in the valleys during the winter, and it never snows except in the higher valleys and near the heads of streams. Snow falls every winter on the elevations back of the timber belt, and sometimes to the depth of several feet; it seldom lies, however, for more than a week or two at most. It has been said, and truly, that any variety of desirable climate is to be had in the valleys of Humboldt County, on her low, rolling, or high hills, or on her coast. It is warmer in winter and cooler in summer than in the heated valleys of the interior.

Maurice Connell, Observer of the Weather Bureau at Eureka, furnishes the following summary of the temperature and rainfall at his station for the year 1891:

TOTAL RAINFALL BY MONTHS.

	Inches.		Inches.
January	3.33	July	0.29
February	9.81	August	0.31
March	5.83	September	1.45
April	6.37	October	1.64
May	1.55	November	2.72
June	1.53	December	11.45

Annual amount of rainfall for the year 1891, 46.28 inches.

TOTAL DAYS ON WHICH RAIN FELL FOR EACH MONTH OF THE YEAR, 1891.

	No.		No.
January	15	July	4
February	20	August	5
March	16	September	6
April	17	October	11
May	11	November	14
June	10	December	24

MONTHLY MEAN TEMPERATURE, 1891.

January	48.0°	July	56.0°
February	45.4	August	59.4
March	49.0	September	56.7
April	50.9	October	54.1
May	53.2	November	52.1
June	56.0	December	43.9

MONTHLY MEAN DAILY RANGE OF TEMPERATURE FOR 1891.

January	13.2°	July	9.5°
February	11.7	August	9.5
March	10.3	September	11.5
April	12.6	October	13.0
May	9.0	November	11.5
June	10.9	December	9.2

Latest spring frost, April 11th.
Earliest fall frost, October 1st.

ANNUAL RAINFALL FROM 1883 TO 1891, INCLUSIVE.

	Inches.		Inches.		Inches.
1883	27.01	1886	35.46	1889	48.70
1884	30.35	1887	40.17	1890	55.54
1885	42.27	1888	36.48	1891	46.28

The soil of the bottom lands and on the hills next the coast is black; that on the bottom is of a sedimentary composition and somewhat argillaceous, while that on the hills rules more of a sandy loam. The soil on the interior hills is composed of disintegrated rock, mixed with organic matter and decayed vegetation.

The capabilities of Humboldt County as a fruit-growing section are very great, and there can be scarcely a doubt that this industry is destined to assume much greater proportions in the future than it has in the past, or than it does at the present time. Until recently, but very little fruit has been sent out of the county, that grown being consumed at home. Nearly every farmer has his own garden and orchard, where he has raised enough for his own use, for that of his neighbors, or for sale to local or adjacent markets. Of late more attention has been paid to the raising of fruit for sale, and the business is liable to expand greatly, as the really excellent quality of the product becomes more widely known. Fruits of most kinds do well, particularly apples, pears, prunes, peaches, cherries, apricots, and berries. Strawberries and raspberries grow in great abundance, and a small area of land in these fruits, well cultivated, will bring an immense return for the labor expended. In the vicinity of Eureka two crops of strawberries are produced per year, of fine flavor and great size. Raspberries bear from June to September, and even in December and January fine raspberries are found on the bushes grown in the valleys.

The yield of all kinds of fruit is generous, and in many instances prodigious, the limbs of apple, plum, and prune trees literally groaning under the weight of the fruit they often bear. Eel River Valley has, for a long time, been one of the finest sections of the coast for the production of apples. It would seem that the soil had been "made on purpose" to bring forth fruit of the most delicate flavor and juiciness, while the climate, neither too hot nor too cold, has doubtless much to do with the result.

Humboldt County was awarded the first premium for the finest exhibition of apples in 1885 at the Mechanics' Fair Institute, in San Francisco, and again in 1889 and 1890 it carried off the highest honors for its superb apples at the State Fair held in Sacramento. The French, German, and Hungarian prune flourish wherever planted and cared for in this county—in the valleys and on the hills.

In the Klamath River country climate and soil are well adapted to horticultural pursuits. Peaches are grown here as large as a teacup, and of the most luscious flavor. They cannot be carried to any market, as they have to be packed on animals, and, from the tenderness of their flesh, are unable to withstand this rough transit. The grapes grown here are of fine flavor and firm flesh. The varieties for table use are particularly good, and the wine made from the wine grape of good body and flavor.

At Rohnerville there are a number of orchards where excellent fruit is produced, the favorite being apples, which here excel in size, flavor, and keeping qualities. Very large shipments of apples, both green and dried, are made from Rohnerville.

Will B. Barber, local fruit inspector for the Ferndale fruit district, comprising the voting precincts of Ferndale, Grizzly Bluff, and Island, has furnished the following figures, taken from records kept during inspection:

Number of bearing apple trees 8 to 30 years old	8,160
Number of unbearing apple trees 1 to 8 years old	5,120
Number of bearing plum trees, including prunes	1,260
Number of unbearing plum trees, including prunes	675
Number of bearing pear trees	190
Number of bearing cherry trees	285
Total number of fruit trees of all kinds in district	15,690

Lately much attention has been directed to horticulture in this county, and a company, "The Southern Humboldt Orchard and Vineyard Company," with a capital stock of $32,000, has been organized to prosecute this branch of industry. A tract of 320 acres of land was purchased near the town of Blocksburg, and 40 acres were planted to prunes and 5 acres to apples last spring.

Humboldt County excels in apples, and of these the favorite varieties are Rome Beauty, Lawver, Stark, Wagner, Arkansas Pippin, Ben Davis, and the Bellflower. These find a ready market, to which point they are shipped by steamers. The apple crop of Humboldt, like the fruit crop of the whole State, was short, not exceeding over half an average crop.

The output of the different varieties of fruit shipped from Humboldt county for 1891 was:

	Pounds.		Pounds.
Apples	740,000	Cherries	16,000
Peaches	60,000	Pears	10,000
Prunes	10,000		
Plums	2,500	Total	838,506

These netted the grower the following prices per pound, green:

Apples	1 cent.	Plums	3 cents.
Peaches	3 cents.	Cherries	5 cents.
Prunes	3 cents.	Pears	3 cents.

The principal fruit sections of the county are Camp Grant, McDarmidt, Rohnerville, Blocksburg, Upper Mattole, Arcata, Bottom, Eel River Valley, Garberville, and Phillipsville. All these sections are adapted to the apple, but peaches, prunes, pears, and many other varieties of deciduous fruits do well, while for berries the conditions seem perfectly adapted. There was a considerable acreage of new land set to fruit this year, but owing to the distance from market there is not the consideration paid to fruit growing in Humboldt County that it deserves.

ACREAGE AND VARIETY OF FRUITS IN HUMBOLDT COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	600	149	749	57
Apricot	5		5	
Cherry	22		22	
Fig	2		2	
Olive	9		9	
Peach	15		15	
Nectarine	1		1	
Prune	275	176	451	87
Pear	8		8	
Plum	9		9	
Quince	1		1	
Walnut		3	3	2
Table grapes	3		3	
Small fruits	94		94	
Totals	1,044	328	1,372	146

INYO COUNTY.

Inyo County, the third largest county in the State, has an area of 10,156 square miles, or 5,196,000 acres. Its boundaries are the State of Nevada on the east, Mono on the north, Fresno and Tulare on the west, and San Bernardino on the south. The entire territory lies east of the Sierra Nevada Mountains, the summit of which forms the western boundary of the county, extending north and south a distance of 120 miles, with a width of 60 miles.

The topography of Inyo County is more marked than that of any county in the State. Here the Sierra attains its greatest elevation and the valleys their greatest depression. It is a country of rugged and giant peaks, among which are Mount Abbott, 12,400 feet; Mount King, 14,000 feet; Mount Williamson, 14,500 feet; Mount Tyndall, 14,386 feet; Mount Whitney, 15,000, and Mount Inyo some 15,000 feet, upon which the snow of ages forever rests, and forming a giant wall upon its west, as if to shut it out from all connection with the State of which it forms a part, marked by precipitous and sharp outlines and deep chasms, such as to render an ascent to their summits from their eastern slopes almost an impossibility. A country where, to the eastward of those peaks pointing heavenward, the earth's surface sinks hundreds of feet beneath the level of the sea, as in that valley, once the valley of mystery and fear, known as Death Valley—a country of beautiful and fertile plains and forbidding wastes; a country of almost arctic frosts and torrid heat.

The agricultural portion of Inyo lies along the foot of the great Sierra range, and is in the main comprised in Owens Valley, through which courses Owens River. The valley is about 95 miles in length, with a belt of arable land varying in width from 2 to 8 miles, and lies at an altitude of about 4,000 to 5,000 feet. It contains about 180,000 acres of arable land, rated from fair to good, of which about 40,000 acres are under claim. Something near 15,000 acres are under cultivation, and irrigated mostly from the numerous brooks and creeks that come down from the snowy Sierra.

Wherever water can be procured for irrigation the soil of Inyo has proved to be very fertile, and very large agricultural crops are produced in Owens Valley. In many portions of the county, however, the soil is absolutely sterile, consisting of vast alkali flats, beds of salt, and sandy wastes. The celebrated Death Valley, with its vast borax lakes, is in this county.

The climate of Inyo resembles that of southern Nevada. Occasionally light falls of snow come in the winter, but do not usually remain long on the ground. Frosts are frequent, and in the higher altitudes severe winters are the rule. The annual rainfall is light, averaging at Camp Independence from 6 to 8 inches annually.

Owens River, the chief stream, takes its water from the Sierra, and flowing a distance of 150 miles south is lost in Owens Lake. This river carries a volume of water 50 feet wide; average depth, 6 feet; flow, 5 miles an hour; and the irrgiation ditch now partially completed will give 50,000 acres of agricultural land, capable of producing fruits and grains. Water comes running down in creeks from the mountains on the west, and affords a bountiful supply for household and irrigating.

The farming lands of Inyo are not found in the valley of the river proper, but on the numerous small mountain streams flowing down from the Sierra on the west, from which the waters are diverted for the purpose of irrigation.

Fruit growing is not extensively followed in Inyo, and what is produced finds a local market. Some excellent apples are grown here, and with better means of communication a profitable industry could be developed in the growth of this fruit. Peaches, pears, and grapes are also grown, and do well where properly cultivated.

There are a number of farmers in Inyo, all of whom have small orchards and vineyards, ranging from 2 to 5 acres in extent. These usually supply the demand for home consumption, and the surplus finds a market in the mines. The fruit produced here is generally very excellent in quality, but the location of the county precludes it competing with the fruit counties of the State. Berries and currants do especially well in Inyo, and are very prolific.

ACREAGE AND VARIETY OF FRUITS IN INYO COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	85	62	147	12
Apricot	11	13	24	7
Cherry	8	6	14	2
Peach	82	28	110	5
Prune	47	25	72	10
Pear	12	26	38	12
Nuts—Almond		2	2	
Walnut	1	3	4	1
Raisins	60		60	
Table grapes	20		20	
Totals	326	165	491	49

Nothing can be accomplished in Inyo County without irrigation, and a number of important irrigating works are established there. The Inyo Canal Company, Mr. F. McIvor, Superintendent, is engaged in a work of much importance to that section of the State. The canal which is now building on the east side of Owens River will be one of the largest works of the kind in the State. Taking water out about 6½ miles north of Independence Station, it will carry it as far as Owens Lake, the entire length of the ditch being 31 miles. In size the ditch is 50 feet wide on the bottom, and will carry 15,000 inches of water. It will cover from 30,000 to 40,000 acres of land, all of which has been entered, and is only waiting for water to be placed under cultivation. At present 1½ miles of the ditch have been completed. Water will be turned on and utilized as fast as sections of the canal are finished.

IRRIGATION WORKS IN INYO COUNTY.

Name.	Miles.	Assessed Value.
Bishop Creek Ditch (irrigating)	8	$1,600 00
Farmers Ditch (irrigating)	6	700 00
Inyo Canal	30	1,800 00
McNally Ditch	10	1,000 00
Stevens Canal	10	1,500 00
Seeley Canal (incomplete)		1,500 00
Totals	64	$8,100 00

KERN COUNTY.

Kern County comprises the southern part of the Tulare Basin and the greater part of the semi-circle of mountains which inclose it on all sides except the north. It is bounded on the north by Tulare, on the east by San Bernardino, on the south by Los Angeles and Ventura, and on the west by San Luis Obispo County. Its area embraces 8,100 square miles, or 5,137,920 acres.

About two thirds of the county is covered by hills, mountains, and a portion of the Mohave Desert. The entire width of the Sierra Nevada range is included in this county, where, trending to the westward, it joins the Coast Range, to the summit of which on the west and south the county extends. The remaining third of the county is agricultural land, including all the mountain valleys. These valleys are generally small, excepting that known as the Tehachapi Pass, and that of the South Fork of the Kern River, which may contain an arable and irrigable area of 30 to 40 square miles. These valleys are the most thickly settled portions of the county. They are well watered and fertile, with differing climates, according to altitude. The greater part of the arable land of the county, however, is in that portion of the Tulare Valley formed by the amphitheater of mountains in the Sierra Nevada and Coast Range. The lowest depressions are its lagoons, some 300 feet above sea-level, where its rivers are lost in the plains; from this to the high peaks of the Sierra there is a rise of 10,000 feet. On the eastern side of the Sierra Nevada is the Mohave Desert, a large part of which is included within the boundary of Kern, where at Mohave Station the elevation is 1,751 feet. The Sierra Nevada crosses the county from the north, with a curve to the southwest, in which is Walkers Pass, with an elevation of 5,302 feet, trending eastward; Tehachapi Pass, 3,964 feet, with a southeasterly trend; Tejon Pass, 5,285 feet, and the Cañada de las Uvas, about the same elevation, with a southerly trend. On the western border of the county is the Mount Diablo range, with an elevation of from 2,000 to 3,000 feet. From the junction of the Sierra Nevada and the Coast Range, the San Emigdio Mountains are projected some 20 miles northward into the valley. The greater portion of the arable land of the county lies in the amphitheater thus formed by the Sierra Nevada and the Coast Range. In this area there are over 2,000 square miles, half or more than half of which is upland, bordering on the foothills to the east and south, and to some extent on the west. In the central portion of the valley lies the lagoon, or bottom lands, among the richest in the county. The margins of the valleys are plains, with elevations of from 1,000 to 1,500 feet, rising to the base of the mountains.

This section has a drainage by Buena Vista Slough to Tulare Lake, 35 miles north by west. Formerly the entire valley was a region of desert and marsh, but about seventeen years ago there was commenced a system of reclamation by irrigation and drainage that has made a great portion of the waste land the most productive in the State. By the drainage and the diversion of the water of Kern River the lakes have become nearly dry, and much of their former beds are under cultivation.

Kern River and Poso Creek are the principal streams of the county, Kern being the third in magnitude of the rivers flowing from the Sierra Nevada south of the Sacramento, the two larger being the San Joaquin, flowing to the ocean, and Kings River, flowing to Tulare Lake.

This river rises among the highest peaks of the Sierra Nevada, in the northeastern part of Tulare County, having two large forks flowing southwesterly 100 miles, 35 miles of which are through the grandest cañons of the Sierra. It enters the valley near Bakersfield, then flowing westward divides into many channels, forming an extensive delta known as Kern Island. The river has a catchment area of 2,383 square miles of the high Sierra, giving it a flow as it debouches on the plain of from 2,700 to 20,000 cubic feet per second in the time of floods.

From where Kern River enters the foothills to the head of the irrigation system of Kern County, is about 30 miles. For 20 miles of this distance the flow is through high, sandy, and gravelly banks; the rest of the distance the banks are shallow, and continue so from this point to Buena Vista Lake reservoirs, 25 miles distant.

Poso Creek has its source in many branches high up in the Greenhorn Mountains, the lofty spurs of the Sierra, rising in T. 25 S., R. 30 and 31, flowing southerly some 25 miles, then westerly and northwesterly until it sinks in the Great Valley in T. 25 S., R. 23 E., after a winding course of 75 miles. This stream falls very rapidly out of the mountains, at 200 feet per mile, discharging its waters very quickly and becoming low early in the season. It has a watershed of 468 square miles. Poso Irrigation District has been formed, and a system adopted for impounding the waters of the stream and the construction of retentive canals for the irrigation of the land of the district.

The mean average temperature is higher than in most of the counties of the State, the average temperature of spring being 65°, of summer 85°, of autumn 65°, and of winter 50°, averaging for the year between 66° and 67°. The highest record of temperature is 118°, and the lowest 16°, in the valley. These extremes are rare, especially the lower one. The atmosphere is dry and rarified, and never extremely oppressive. The nights are usually cool. The long, warm season renders possible the production of two crops of grain or vegetables per year, on irrigated land, and is of great advantage to the fruit grower in the drying season. The rainfall is below the average, rarely exceeding 5 inches for the season. For the past four years the precipitation is given as follows:

	Inches.
1887-8	4.15
1888-9	4.58
1889-90	3.50
1890-1	5.16

The meager rainfall, of course, necessitates superior irrigation facilities, and the very heavy precipitation in the mountains, often exceeding 100 inches, makes them possible. The precipitation in the mountains is snow, which is preserved by the high altitudes until midsummer, the time it is most needed on the plains below, when it is discharged through the rivers and creeks in enormous volume.

There are in this county a number of mountain valleys of varying extent and fertility, among the more prominent of which are Poso Flat, Little Poso, and Glenville, or Linville, beautiful parks on Poso Creek in Greenhorn Mountains, a spur of the Sierra Nevada west of Kern River. Havilah is in a deep valley of Clear Creek, a branch of Kern, 35 miles northeast from Bakersfield. Tehachapi Valley extends from near the summit of the Sierra Nevada at Tehachapi Pass, southeast along the valley of Camera Creek into the Mohave Desert, with a length of 8 miles, and ranging in width from a quarter of a mile to a mile. To the southwest are the smaller valleys of the Tejon, Los Uvas, San Emigdio, Zapatero, Pastoria, Casteria, and La Siebia.

The soil of all these valleys varies from sandy loam to heavy adobe, approaching to gravelly in the higher foothills. There is a great deal of the red land (the favorite fruit land) along the foothills. The prevailing soil, however, appears to be a fine sand mixed with loam, and exceedingly fertile when water is applied, but barren without.

Kern is one of the best irrigated counties in the State, and its main canal and lateral ditches have an aggregate length of 650 miles. These are supplied from the Kern River, from which thirty large irrigating canals have been taken. The largest of them is the Calloway Canal, which taps the river 1½ miles northeast of Bakersfield, where the river is 480 feet wide. This canal leads northwesterly a distance of 32 miles, is 80 feet wide on the bottom and 120 feet wide on the top, has banks 7 feet high, and usually flows 6 feet, and has a grade of eight tenths of a foot per mile. It commands an area of 200,000 acres.

Sixty-five distributing ditches, from 8 to 20 feet wide, are taken from it, having an aggregate length of 150 miles.

Kern Island Canal is taken from Kern River about 2½ miles northeast of Bakersfield, and flows through the city. It is 48½ feet wide at the bottom and 4 feet deep. At Bakersfield this canal has a drop of 20 feet, where it furnishes power for a large flouring mill.

It was commenced in 1870, and is one of the oldest of the system of irrigating and water-power canals in Kern County.

E. E. Young, in writing of irrigation in Kern County, describes the system as follows:

"The point in Kern River, which has been selected as the head of the irrigating system, and from which the first canals are taken, is high enough to cover or make irrigable about 600,000 acres of land in this delta. This has a general slope of from 5 to 8 feet to the mile, to the south and west. To the natural eye it appears almost as level as a floor. There are no hills, forest trees, ravines, rocks, or other obstructions to check or divert the water in its downward flow. Nature has done the needful, and man has merely to make the application. This is the secret of the wonderful success of irrigation in Kern County.

"This system was begun in 1875, and was one of the first in California to assume important and scientific proportions. Up to this time the irrigation works of Kern River consisted of a few miles of small ditches conducting water to a few hundred acres of cultivated land, located in the vicinity of Bakersfield. The water was taken from the river direct by ditches, which conveyed it to the land under cultivation. The expense of these ditches and their maintenance soon became too great for the few parties in interest, and after repeated attempts to induce coöperation, the project was abandoned.

"At this point J. B. Haggin and Lloyd Tevis came upon the scene. These men saw at that early date what inestimable gifts nature had bestowed upon Kern County. They knew that the trinity of water, soil, and sunshine would prove the talisman of great wealth in the not distant future. They began the system of irrigation which has since grown to such important proportions.

"They employed the best engineers obtainable to take charge of the work. They spent thousands of dollars in experimenting, and numerous mistakes were made. The subject of irrigation was, at that time, comparatively new in the United States. Numerous self-constituted advisors appeared and predicted failure and bankruptcy for these bold projectors.

"It is, then, to no public legislation or State enactment that Kern County is indebted for her model irrigation system. All credit is due primarily to private enterprise. Singly and alone these men have accomplished the greatest irrigation project of the nineteenth century in America. They have done what is often so hard for financiers to do—

put their own money in the enterprise they represent. In backing their judgment with money they have been successful in this as they have in every other enterprise. Up to date the total expenditure on their irrigation system amounts to $3,500,000. Improvements and extensions are now under way which will cost another half million, thus bringing the total cost up to $4,000,000.

"At the point on the river from which the water is distributed throughout the Kern Delta, the banks are low and sandy. This reduces the cost of diversion to the minimum. This same alluvial deposit, composed largely of a rich, sandy formation, obtains throughout the delta, and has greatly reduced the cost of the system. It is estimated that if the river banks were high, or the country rough, or composed in part of hardpan, the irrigation system would have cost 100 per cent more.

"There are twenty-seven main canals in this system. These have an aggregate length of about 300 miles. There are more than 1,100 miles of ditches and laterals fed from these main canals. This does not include the arms of ditches used to convey the water to each 20-acre lot in the colonies."

Following is a list of the canals in Kern Valley, with their size, and the amount of water appropriated:

Name of Canal.	Miles in Length.	Inches of Water.	Cubic Feet Per Second.
North Side of River.			
Beardslee	8	47,236	938
McCord	14½	5,000	100
Calloway	32	74,000	1,476
McCaffrey	3	1,296	26
Emery	3	2,000	40
Jones & Tuckey	4	1,000	20
Wible	⅕	5,040	100
Railroad	⅗	31,075	620
Goose Lake	4½	90,000	1,795
Pioneer	11½	20,074	400
Edwards	2	1,440	29
James & Dixon	3	14,000	279
Johnson	4	8,640	172
Ashe	1	1,200	24
May	2	4,000	80
Joice	4	6,250	125
Dixon	2½	3,450	69
Totals	99⅘	315,701	6,293
South Side of River.			
Kern Island	18	20,000	400
Old South Fork	3	3,800	75
Farmers	19¾	14,400	287
Castro	5	1,000	20
Stein	47½	55,980	1,117
Anderson	4	5,057	101
Gates	2½	5,057	101
Buena Vista	13¼	14,000	279
James	17¼	19,730	394
Plunket	3¾	5,057	101
Meacham	4	1,500	30
Wilson	2½	500	10
Henley	2¼	2,880	57
Traver	2¼	2,600	52
Kern Valley Water Co.	40	130,000	2,594
Totals	185¼	281,561	5,618
Grand totals	285 1/20	597,262	11,911

South of Tulare Lake is a large tract known as the artesian belt, in which a large number of flowing wells have been sunk. They range in depth from 200 to 460 feet, penetrating strata of sand, clay, and gravel. The flow of these wells ranges from 1,000,000 to 2,500,000 gallons every twenty-four hours, and it has a uniform temperature of 71° winter and summer. These wells already irrigate very large areas, and this is steadily increasing. The area included in this artesian belt is about 50 miles north and south, with an average width of 15 miles. There are about twenty of these wells near Miramonte, and they vary in depth from 250 to 650 feet, and cost from $500 to $4,000 to sink. Their flow varies from 100,000 to 4,000,000 gallons daily.

Buena Vista Lake has been converted into a reservoir by Henry Miller and J. B. Haggin, the work having been commenced in 1888 and concluded this year. It covers 25,000 acres, and has a capacity of 50,000,000,000 gallons. The work cost $300,000.

Fruits of nearly all varieties do well in Kern County. Peaches, nectarines, apricots, prunes, plums, and cherries all do well, as do apples and pears. In favored localities around the foothill region oranges, lemons, and other members of the citrus family do well. Nuts also, so far as tried, have been very successful, and walnuts, almonds, and pecans grown in Kern are equal to those produced anywhere.

Plums and prunes thrive especially well, the favorite varieties being the Petit Prune d'Agen and the Hungarian.

The more common varieties of apples will hardly repay the producer; but the man who will plant nothing but healthy trees, of the higher-priced varieties, will soon see his way clear to the possession of a tidy little bank account. The varieties most popular in New York, New Jersey, and the New England States are the ones that thrive best here. These include the Newtown Pippin, Red Pearmain, and Spitzenberg among the best keepers, and the Rhode Island Greening, which is the monarch of all the fall ripeners. Those who desire a good apple for cider, and for that indispensable farmers' sauce known as "apple butter," will find a very good one in an apple much grown in the northern portions of New Jersey and Delaware, and known as the Harrison. This is a small, yellow apple, generally esteemed by housewives for cooking purposes, its lack of size being its chief objection, but the tree is a very prolific one, and seldom gives short weight. Another apple from northern Jersey is called the Canfield, or Campfield, and attains a large size.

While most varieties of fruit do well in Kern, the peach seems to do especially well, and it is the favorite fruit; and a local writer says, in regard to its productiveness and profit:

"While peaches of fine quality are produced in nearly every county of the fifty-four that constitute this great State, it is no exaggeration to assert that the orchards of the valley lands of Kern County stand preeminent. In earliness of maturity, rapidity and thriftiness of growth, abundant productiveness, and size and flavor of fruit, the peach orchards of this section are absolutely without a peer. That this is no mere unfounded assertion will be proven by a few facts easily susceptible of corroboration, and which may be classed as phenomenal, though not at all exceptional in the region referred to.

"From 15 acres of the George's Cling variety, when the trees had been in orchard but eighteen months, there was harvested a crop of 5 tons of first-class fruit. At the time this fruit was growing, a crop of potatoes that yielded some $500 was taken from the ground between the trees. The following year the trees were so burdened with young fruit that it became necessary to remove half to two thirds thereof. The remainder matured magnificently, and from the orchard there were shipped 7,731 boxes of fresh fruit, 3,000 pounds of dried fruit, which sold for a high price, and several hundred boxes of choice specimens that were given away or sold in small quantities. The gross yield of this crop was $360 an acre, and the entire expense of cultivation and harvesting was a little over $21, leaving a net return of almost $340 for each acre.

"Another remarkable instance of success in peach culture is that of a seven-year old (1890) peach orchard of 20 acres—17 in George's Late Cling and 3 in Orange Cling. Unfortunately no record was kept of the actual yield of these trees for the first five years, but the third season after planting there was a fair amount of fruit, while in the fourth and fifth years there were good crops, which sold at $40 to $45 per ton. The sixth year the crop was 5,600 boxes of 20 pounds each, and the price obtained was 4½ cents per pound. The seventh (1891) year there were gathered 16,013 boxes of George's Late and 2,500 boxes of Orange Clings, besides which there were over 4 tons of dried fruit. The total receipts were $13,307, while the entire cost of production was but $1,300, leaving a net return of $12,000, or $600 an acre. Other equally remarkable instances might be cited, did not lack of space forbid, but these will suffice for illustration.

"Not the least remarkable feature of the peaches produced in Kern County is their large size, high color, and fine flavor, coupled with qualities that enable them to be shipped to the Eastern market with little or no loss. Hundreds of boxes were packed last year, in which each peach weighed a pound or more, while frequently specimens were gathered that were from twenty to twenty-three ounces in weight."

The shipments of peaches from Bakersfield in 1891 amounted to 79,500 boxes, and this output will be greatly increased the present season, by reason of the new orchards which are coming into bearing. The chief fruit sections of the county are Bakersfield, Delano, Rosedale, Onyx, Weldon, Kernville, and Glenville, and the prevailing varieties in order of importance are peaches, apricots, plums, prunes, apples, and pears. Besides these there is a very large acreage in raisin grapes, which do equally as well in Kern as in the other southern San Joaquin counties.

In most sections of the county the fruit crop has been greater this season than in most counties of the State. While it is not reported as full, owing to a late spring, which caused a shortage in many parts, the percentage of loss in Kern was much less in this than in most parts of California. A very large area of new land was set to fruit here this season, over 2,000 acres having been planted, the greater part in the vicinity of Bakersfield. Kern is rapidly taking a front place among the fruit counties of the State, and she is especially favored for this purpose in soil and climate. A new irrigation project, alluded to above, is now under way, which will put a very large section of new land under water, and a great many land owners under the system are already making plans for setting out large tracts to orchard the coming season. It is therefore probable that the present season's record will be greatly exceeded by the next. The high prices paid for fruit this season, too, will give an additional impetus to the work.

ACREAGE AND VARIETY OF FRUITS IN KERN COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	226	112	338	58
Apricot	79	221	300	126
Cherry	10	15	25	8
Fig	56	25	81	5
Olive	1	30	31	10
Peach	662	417	1,079	128
Prune	399	547	946	89
Pear	65	250	315	53
Lemon	1	2	3	1
Orange	8	18	26	5
Nuts—Almond	39	128	167	43
Walnut	30	41	71	12
Raisins	5,600		5,600	
Table grapes	210		210	
Totals	7,386	1,806	9,192	538

Pears of all kinds do well in this region. The Bartlett pear, which always finds the readier sale and generally brings the better price, is much hardier as a tree and gives the orchardist less anxiety during the earlier stages of its existence. All the later winter pears have thriven in this locality, especially the Easter Beurré, which can be made to attain great size with moderate irrigation. After picking they must be housed in dry and cool cellars and kept until the holidays, and the expense attendant upon this procedure is generally accompanied by prices that compensate for the extra outlay.

LAKE COUNTY.

Lake County, which on account of its scenic beauties, is named the Switzerland of America, lies about 100 miles north of San Francisco. Its boundaries are Napa on the south, Yolo and Colusa on the east, Mendocino and Glenn on the north, and Mendocino and Sonoma on the west. The county is about 75 miles long and 25 miles in width, and lies between two broken ridges of mountains, the Macayamas on the west, and the Coast Range, locally known as the Bear Mountains, on the east. It has an area of 1,078 square miles, or 704,000 acres, of which the larger part is mountain. At the southern extremity is Mount St. Helena, at the northern Mount Hull, while in the center is located Clear Lake, a magnificent body of water 25 miles in length and 6 miles in width. It is from this that the county takes its name. This lake is situated at an elevation above the sea of 1,350 feet; the eastern shore is skirted by high mountains, but not abrupt, while at the center, on the western shore, it is almost divided into two lakes by Mount Konocti, or, as it is commonly known, "Uncle Sam," which rises out of the bosom of the lake to a height of 1,500 feet.

While Lake is a mountainous county, there are, nevertheless, a number of fertile valleys found ensconced among its hills. Some of these are of considerable extent and very fertile. Big Valley, which lies on the southwest shore of Clear Lake, comprises within its area 2,500 acres of first-class valley land, capable of producing all classes of agricultural and horticultural crops. The valley is well watered by three streams which pass through it, namely, Kelsey Creek, Cold Creek, and Adobe Creek. All of these streams take their rise in the mountains, pass through the valley and empty into the lake. Scott Valley lies along Scott Creek, in the center of the county, west of the lake, and contains about 7,000 acres of very rich land. Contiguous to the valley is also a large area of fine foothill land. Artesian water can be had anywhere in the valley at depths of 80 to 100 feet. Bachelor Valley, which lies north and west of the lake, contains about 3,000 acres of land, and is surrounded by low, open hills. Upper Lake Valley lies at the extreme north end of the lake, and embraces some of the best quality of land, much of which is under cultivation. Lower Lake Valley is at the south end of the lake, and is formed by the junction of Copsey and Seigler Creek Valleys, forming a large and fertile tract. On the foothills surrounding this valley are found the largest and finest vineyards in the county. Coyote Valley, in the southern portion of the county, contains 15,000 to 20,000 acres of fine land, and is formed by the junction of St. Helena and Putah Creeks. On the same creeks lies Loconoma Valley, separated from Coyote Valley only by a low range of hills, and being virtually a continuation of the same. Here are found some of the finest orchards and vineyards in the county. Burns Valley is small, but romantic and productive, and contains some beautiful residences. Cobb Valley is formed by the upper waters of Kelsey Creek, which takes its rise in Cobb Mountain. Besides these there are a number of smaller valleys, including the Capay, Clover, Donovan, Gravelly, High, Irwin, Jericho, Jerusalem, Long, Morgan, Paradise, Rice, The Twin, and others, all containing fertile land, capable of cultivation and heavy production.

The great charm of Lake County is its climate. The winters are never severely cold nor the summers oppressively hot. From November to April much rain usually falls, and ice occasionally forms in some places, but during this period there are days and weeks at a time when the sun shines brightly and the weather is perfectly delightful. Flowers usually bloom all winter, which is a sufficient evidence of mildness.

From May until November the weather is always fine. But little rain falls, and though the summer days are warm they are not often sultry. A gentle breeze nearly always springs up in the afternoon, and though the evenings are sufficiently pleasant for one to sit out of doors until bedtime, the nights are usually cool enough to make a light blanket or quilt comfortable as a bed covering. Fogs are rare, and chilling winds almost unknown.

The following table shows the average precipitation, by months, at Kono Tazee and Middletown:

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Kono Tazee ..	5.13	3.78	4.17	1.04	.50	.48	.00	.00	.17	1.07	3.35	2.28
Middletown ..	7.66	4.48	6.23	7.87	1.35	.72	.00	.00	.80	1.35	3.02	8.67

The valley soil of Lake County in general is a very rich alluvium of great depth and rare fertility. In the hills there is a larger admixture of gravel, but here in many cases the soil is from 10 to 12 feet deep and very retentive of moisture, rendering irrigation unnecessary.

The resources of this county are mostly derived from the crops of wheat, barley, oats, corn, hops, and potatoes; from fruit, from sheep and hogs, and from the pineries and quicksilver mines. Wine making is becoming an important industry, wineries being established at Lower Lake, Middletown, and on the northwest shore of Clear Lake. The best fruit lands are in the foothills. They are well watered, but as there is a sufficient rainfall to insure good crops no irrigation is necessary. All kinds of fruits do exceedingly well, especially the apple, pear, peach, apricot, plum, and prune. The Newtown Pippin apple, prized so much in the Eastern States and exported largely to England, grows to great perfection; pears likewise, the Bartlett pears from Lake County commanding a very high price in the San Francisco market. Lake County, however, is behind her sister counties of California as a fruit producer, but comparatively little attention so far having been paid to this branch of industry. Her soil and climate are well adapted to fruit, and with easier means of communication with the outer world there is little question but that horticulture would soon come into prominence.

The principal fruits grown are apples, pears, and prunes. The market for these is to a great extent local, although a large part of the apple crop finds its way to San Francisco. The output for this season is very light, prunes being reported as an almost total failure, apples but half a crop, and pears about a third. But little planting has been done this year, the difficulty of reaching markets acting as an impediment in the way of extensive planting.

There are a number of old orchards in Lake, one at Kelseyville, of apples and pears, now owned by Mr. McIntyre, being thirty-five years old. The Herrick orchard is the same age.

W. P. Filmer has established an olive orchard of 800 trees, which, although as yet too young to bear, gives great promise for the future, and proves that Lake is suitable for olive growing.

ACREAGE AND VARIETY OF FRUITS IN LAKE COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	158	70	228	18
Apricot	10	12	22	3
Cherry	9	35	44	9
Fig	12	13	25	3
Olive	1	53	54	10
Peach	140	70	210	20
Prune	160	278	438	73
Pear	54	99	153	25
Orange		1	1	
Nuts—Almond	9	16	25	4
Walnut	15	60	75	20
Raisins	4		4	
Table grapes	450		450	
Totals	1,022	707	1,729	185

There are no irrigation works in Lake, and irrigation is practiced on so small a scale that it may be said to have no existence there. The soil is generally of a pervious character, and holds moisture in sufficient quantity to answer all the requirements of the orchardist.

LASSEN COUNTY.

Lassen County is one of the most northerly counties of California, being separated from Oregon by Modoc County. It lies on the eastern slope of the Sierra Nevada Mountains, and is bounded on the north by Modoc County, on the east by the State of Nevada, on the south by Plumas, and on the west by Shasta County. Its southern boundary is very irregular, running in a southeasterly direction from Shasta to Sierra County, making its eastern boundary on the State of Nevada 105 miles in length, while the western boundary, on Shasta County, is not more than half that extent. Its area is 4,750 square miles, or 3,040,000 acres; of this there are 375,000 acres of valley land, 325,000 acres of foothill land, and the remainder is classed as mountain.

The county is a succession of mountain ranges and valleys, and although in the central and eastern parts the hills seem to have been placed regardless of direction or order, the ranges have a general trend to the southeast and northwest. A ridge having an altitude of 8,200 feet, and called Diamond Mountains, makes the dividing line between Lassen and Plumas Counties. Diamond Mountains form the southern side of Honey Lake Valley, which extends southeast and northwest a distance of 45 miles, with a width of about 15 miles. In the extreme northwest corner of the county lies Big Valley, a large stretch of agricultural land, extending into Modoc County and comprising in Lassen County about 75,000 acres. This valley is watered by Pitt River, Ash Creek, and several smaller streams. Long Valley lies in the extreme southeast of the county, contains for its size but little agricultural land, but is remarkable for its singular conformation. Its south side is a high and very heavily-timbered ridge, while the rise in the north is gradual and the country dry, timberless, and open. The valley is about 40 miles in length but very narrow, having an average breadth of from 1 to 3 miles between Big and Honey Lake Valleys, separated from each other and from the main valley by intervening ridges of various lengths. The last named valleys are very small, containing but few ranches, and are mostly occupied by the bodies of water from which they take their names. In the eastern-central part of Lassen County lie the Madeline Plains, a large level tract of land, and at an altitude of 5,300 feet. This plain appears to have been at one time the bed of a lake, and to have been formed to its present condition by some change of nature. It is about 35 miles long and 15 miles wide, and is covered with a dense growth of sagebrush.

There is a great contrast in the climate in the counties east and west of the Sierra Nevada range. In the northeastern portion of California, the seasons more nearly approach those of the Eastern States, but are not so severe. In Lassen County there are heavy falls of snow in the winter months, and heavy freezes are common.

The air is bracing and tonic, being at no time oppressive. The mercury rarely goes above 85° or 90°, 75° to 80° being the more common midsummer temperature at noon. The nights are always cool, but not affording excessive contrast with the day temperature noticed in portions of California.

The rainy season occurs the same as in San Francisco, the precipitation being about the same on the mountains. The precipitation varies with the altitude and the distance eastward from the Sierra. The Sierra plateau, above described, presents no western arresting wall against the moisture-laden clouds from the ocean, and the fall of rain and snow is very heavy, especially the latter. According to United States Signal Service maps, the average is nearly double that on the highest mountains of Los Angeles and San Bernardino Counties. This melting snow supplies our irrigating water in Susan River, Willow Creek, Ball's Cañon Creek, and other streams and Eagle Lake, providing permanent and liberal irrigation for a vast area.

As illustrating the climate of Lassen County, T. B. Saunders, Observer at Susanville, forwards the following report for last year:

	Highest Temperature.	Lowest Temperature.	Mean Temperature.	Rain.	Snow.	Days Snow.
January	50	4	32	1.00	8	7
February	50	8	32	7.84	40½	16
March	60	12	43	2.49	8	11
April	73	31	46	.75	¾	11
May	78	40	57	2.41	....	....
June	89	48	61	1.65	....	....
July	93	48	75½	.55	....	....
August	93	48	71⅜	....	....	....
September	88	37	65	.65	....	....
October	74	30	52	.45	....	2
November	69	24	43½	1.10	....	6
December	43	12	30½	3.68	34	12

Monthly average temperature, 50⅝.
Total rain and snow, 26.90.
First frost, April 19th, did no damage.
Frost on September 2d, 3d, 29th, and 30th, did some slight damage.
The first killing frost of the season occurred on October 1st, 2d, and 3d, destroying all kinds of vegetables.
Thunder storms occurred on April 17th and October 15th.
Hail storms occurred on April 7th and 24th.

The soil along the streams is either a dark or a sandy loam; on the plateaus generally a light red loam. On the foothills and mountains is a decomposed lava formation, which also enters largely into the composition of the valley and lowland soil. The soil of the greater part of Honey Lake Valley is a sedimentary deposit from the waters which once covered its entire area, mingled with a certain proportion of humus, or mold, from decayed vegetation, the accumulation of ages. It is charged with all mineral elements needed for constant production of crops. No diminution in the yield is observed, after thirty years' continuous cropping, with little rotation of crops.

The soil is several feet deep, and underlaid by what is perhaps equally fertile, but heavier strata, carrying more clay. The valley has no "hardpan," "hog wallows," and few mounds of any sort, no gullies, rocks, or other impediments to easy cultivation. In general, it would be called a rich, sandy loam, but in places is of a more clayey nature. East of Honey Lake it is lighter colored, being a volcanic ash, much resembling the fertile "white ash" land in Fresno County.

Owing to its rigorous winters and lack of rainfall in the summer months, irrigation is absolutely needed in most parts of Lassen County to grow crops. No winter crops can be grown in the season of precipitation, and in the summer, when climatic conditions are favorable, no rain falls. To meet this difficulty Lassen has several irrigation works completed or under way, that will make arable a large area of now barren land. The Lassen County "Advocate" gives the following description of some of the irrigating work that has been done in this county:

"As Susan River, after it leaves the mountains at Susanville, flows its entire course of 20 miles eastward to Honey Lake, through level bottom lands, at times spreading into several channels, irrigating as it goes thousands of acres of natural grass meadows, it follows that reservoirs cannot be built along its banks outside the mountains. But many years ago Ben Leavitt conceived the idea of taking water from the river during flood times, and carrying it to a natural depression, basin, or lagoon, situated 8 miles below Susanville, at an elevation above the river. Its level bottom of more than a mile square is sometimes covered with water several feet deep, from hills on its south side, and Leavitt discovered that by making an early levee on the north side about 2 miles long, a storage basin would be made where water could be stored to the average depth of about 25 feet, over an area of about 2,000 acres. So far as we are informed, this is the largest reservoir in California, or known to us anywhere. Each acre, with water 1 foot deep, contains 43,560 cubic feet, and 2,000 acres, at same depth, 87,120,000 cubic feet, and 25 feet in depth equals 2,178,000,000 cubic feet, or 16,335,000,000 gallons. This basin is known as Lake Leavitt, and is now in condition to hold in reserve an average depth of 10 feet, and at the outlet a 22-inch iron pipe, with gate, is placed.

"Water is taken from the river, and is flowing into Lake Leavitt by two canals. One was commenced several years ago, and opened to the lake, and was last year enlarged to a capacity of about 500 inches, miner's measurement. It is about 4 miles long. The other feeding canal, just completed, is 5 miles long, 30 feet wide on the bottom, about 3 feet deep, and will be deepened next year. The fall is 24 inches per mile. Excepting two short cuts and two short fills, the earth is all thrown on the northern, or lower side of the canal. With this majestic artificial river, flowing at as great speed as the safety of the banks will permit, it will not take long to fill Lake Leavitt. Unappropriated water has already gone to Honey Lake this season sufficient to fill the reservoir many times over, and the flow will keep up and increase most of the time until next June.

"Water is taken from the river and diverted into these canals by two dams, built under the direction of Mr. Leavitt several years ago. The dams are built of stone, logs, and earth, and are as solid as a rock. The central portion is of plank, and can all be removed to allow the floods to pass through, this being necessary in high water.

"In addition to the foregoing, Hutchinson & Leavitt have completed a reservoir at McCoys Flat, 20 miles above Susanville, to the extent of covering about 1,500 acres some 10 feet deep, and will next year enlarge its capacity.

"At Hog Flat, 2 miles below the other, a similar table basin is being converted into a reservoir, although work was suspended by the early fall storms.

"Together with other reservoir work in the county contemplated for the coming season, Hyer & Long, of Madeline, have begun work at Maiden Flat, 2 miles from the plains, where they claim that 400 acres of ground can be covered with water from 15 to 20 feet in depth. When this enterprise is completed, their hay crop will be increased from 250 or 300 tons per season, to 600 or 800 tons, as they have an extra fine body of land awaiting reclamation."

IRRIGATION WORKS IN LASSEN COUNTY.

	Assessed Value.
West Side Ditch Co.	$2,000
Meadow Ranch Reservoir	2,000
Union Reservoir	2,000
Union Reservoir, North Development Association	2,000
Hutchinson, Leavitt, and Eagle Lake Water Co.	2,500
Total	$10,500

There has been a great impetus given to the saving of water by means of reservoirs in Lassen County in the past few years. This work was first begun in 1888, and there are now eight reservoirs, either completed or in course of construction, in the county. These vary in extent from 200 acres to 1,200 acres or over. With these completed vast bodies of land now useless for lack of water will be brought under cultivation.

At Amadee, on the east side of Honey Lake, several artesian wells have been sunk. These are from 150 to 400 feet in depth, and give an average flow of 40 gallons per minute. The cost of sinking these wells is $1 per foot.

The fruits which grow in the temperate zone do well in Lassen County. Apples, prunes, pears, cherries, peaches, plums, apricots, nectarines, and small fruits are rarely surpassed in size, flavor, or yield. For apples, especially, Lassen County is celebrated, and those grown here are unsurpassed anywhere in California or the East.

No fruit trees in the valley were ever injured by the cold of winter or the sun of summer. Late spring frosts occasionally nip the early vegetables, and the fruit crop is reduced to a greater or less extent about once in three or four years. There are in Honey Lake Valley fifteen or twenty apple orchards, which ship from 5,000 to 20,000 boxes of apples per year by rail. The profit on these orchards is from $100 per acre upward. J. M. Steinberger says: "I harvested in 1890 about 800 boxes of apples from one acre in my orchard, for which I got $1 per box on the ranch. The trees were ten years old."

Wm. Cain has four hundred apple trees—Pearmain, Spitzenberg, Winesap, Rhode Island Greening, and Limber Twigs—besides pears, plums, peaches, cherries, etc. He sold last year $1,500 worth of apples; vinegar and cider, $400; alfalfa, $400 (50 tons at $8); all from 10 acres of sagebrush land. Mr. Cain bought the place he now occupies, just outside of Susanville, in 1882, and has since acquired more land adjoining, so that he now owns 100 acres. He does a general farming business, but it is the object of this sketch to speak more particularly of his orchard.

He has about 10 acres under apple, pear, peach, and plum trees, with quite an assortment of small fruits, cherries, blackberries, strawberries, raspberries, etc. All his fruit he sells to local customers, right at the orchard, and never has enough to supply the demand. He has four hundred apple trees, most of them in bearing. Last year he picked and sold 2,000 boxes, each box containing 50 pounds, and received for his crop 75 cents a box at the orchard. Besides this he had apples for his own use until the following May, and he made 2,000 gallons of cider vinegar, which he sold at 25 cents a gallon. He raises, principally, winter apples of the following varieties: Red and White Pearmain, Spitzenberg, Winesap, Rhode Island Greening, and Limber Twigs. His trees are set 30 feet apart, and are not irrigated. Mr. Cain says orchards do not need irrigation, except on high, dry land.

Bartlett pears do splendidly on his place; they sell for $1 25 a box—other pears at $1. The pear trees bear so full every year that he has to prop up the branches to keep them from breaking. Plums always yield profusely, and sell at $1, and he never has a failure of peaches, which sell at the same price, bearing so heavily as to break many of the branches, in spite of his efforts to save them. Cherries also bear well, and come to full maturity, selling at 6 cents a pound.

The apple is the only fruit shipped out of Lassen County in any quantity, and finds its principal market in Los Angeles, San Francisco, Sacramento, Reno, and Virginia City. The fruit is shipped in 50-pound boxes. The estimated output of the apple orchards of this county in 1891 was 30,000 boxes. This year the output will be much smaller, as there is not over half a crop of apples this season, and the new orchards which came into bearing will not add enough to the total to overcome the shortage. The acreage in apples of the principal fruit sections in Lassen County is:

	Acres.		Acres.
Janesville	35	Big Valley	12
Susanville	70	Scattering	50
Milford	150		
Long Valley	20	Total	337

The apples grown here are superior in size, flavor, and keeping qualities, and compare favorably in these respects with the best Eastern products.

Fruit has been grown in Lassen for twenty-eight years, the first orchard having been planted by a Mr. Elliott in 1864, with apple trees imported from Oregon. No great progress was made in the industry, however, for many years, and the opening of a railroad in Honey Lake Valley, which gave rapid and easy transportation to market, gave the first impetus to the industry which, from a commercial point, has been the growth of the past few years. The area of orchards in Lassen is being increased annually, by far the greater part of the young trees set out being apples.

ACREAGE AND VARIETY OF FRUITS IN LASSEN COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1890.
Apple	300	37	337	12
Apricot	30	23	53	10
Cherry	2		2	
Peach	10	15	25	7
Prune		2	2	
Pear	58	10	68	3
Plum	14	7	21	1
Nuts—Almond		1	1	
Walnut		2	2	
Small fruits		74	74	
Totals	414	171	585	33

LOS ANGELES COUNTY.

In wealth, population, and resources Los Angeles is the most important county in Southern California, and ranks next to San Francisco in the State. She has within her boundaries 4,812 square miles of territory, or 2,613,000 acres. Kern County bounds her on the north, San Bernardino on the east, Ventura on the west, and the Pacific Ocean and Orange County on the south.

There are two rivers in Los Angeles County, one named the Los Angeles, the other the San Gabriel. During a large part of the year these are mere dry beds of sand, what little water they contain finding its way through the porous sand or the bedrock. In the winter months they are dangerous streams. The Los Angeles River rises in the western part of the San Fernando Valley, about 12 miles northwest of the city, and flows easterly 18 miles to the Los Angeles Pass. Its stream is fed all along by springs. Two other "rivers," the Pacoima and the Tejunga, join it in the San Fernando Valley. Turning south, it flows through the Los Angeles Pass, and on through the city. In former years its waters flowed through the southwestern part of the city, and out through the Cienega district, and emptied into the ocean through La Ballona Harbor. Subsequently the river changed its course, and for years emptied its waters into the lowlands around Compton and Wilmington.

The San Gabriel River has two principal sources in the Sierra Madre. The north fork rises in T. 2 N., R. 12 W., San Bernardino base and meridian, and flows easterly through three townships into T. 2 N., R. 9 W., where it forms a junction with the east fork. The latter stream rises in T. 3 N., R. 9 W., and flows southerly. From the point of junction the river flows southwesterly to the ocean. For years before the great flood of 1825–26 it discharged its waters into the lowlands north of Wilmington. After that it joined the Los Angeles River in T. 4 S., R. 13 W. The winter of 1867–68 witnessed another great flood. The San Gabriel River then broke over its banks in T. 2 S., R. 11 W., and flowing southerly cut a new channel through to Alamitos Bay. Since that time its waters have been divided between the old and the new channels.

Los Angeles County rises in three terraces from the sea to a height of 2,200 feet. Back of these elevated plains are mountain ranges from 5,000 to 6,000 feet high, with occasional peaks having an altitude of 9,000 to 10 000 feet. The lowest of these three great benches rises from the sea to an altitude of about 500 feet. South and west the Pacific Ocean washes its shores. On the north side of this first terrace or plain is a range of hills, which have an average altitude of 1,500 feet. They run easterly from the Ventura coast-line through the county to the San Bernardino county line.

The terrace itself is divided into two valleys. The one to the northwest is known as the Cahuenga Valley, and the one on the southwest as the Los Angeles Valley. The "divide" between the two valleys, however, is very slight. This is shown by the old bed of the Los Angeles River, which formerly crossed this "divide" and found an entrance to the ocean through the lake called La Ballona, which is situated at the mouth of the Cahuenga Valley. This latter valley's greatest length is about 20 miles, and its greatest width about 10 miles, but is quite irregular in shape. On the west a table-land projects southerly from the Santa Monica hills along the ocean shore to La Ballona Lake, and easterly from the ocean shore-line for some 3 or 4 miles. On the south side of the valley the table-land rises again, and culminates in the high point of the Palos Verdes Peninsula.

The Los Angeles Valley, or properly a plain, is some 50 miles long by 20 miles wide. It reaches over into Orange County on the southeast, and lies between the ocean on the south and the Puente and San Gabriel hills on the north. The surface of this valley rises gently from the sea to an altitude of some 500 or 600 feet.

The second grand terrace consists of the magnificent valleys of San Fernando and San Gabriel. These valleys are separated from each other by a small spur of hills known as the San Rafael, which project southerly from the Sierra Madre Mountains, and terminate opposite the Los Angeles Pass. The San Fernando Valley is about 36 miles long by 12 miles wide. It has a gentle slope from the Sierra Madre on the north toward the Santa Monica and Cahuenga hills on the south. On the west side are the Santa Susana hills. The valley has an elevation above the sea-level from about 500 to 1,000 feet.

The San Gabriel Valley is about 25 miles long by 10 miles wide. Like the San Fernando Valley, it slopes gradually from the Sierra Madre down to the San Gabriel and Puente hills. Its elevation runs from about 500 to 1,500 feet.

Rising to the north of the two valleys of San Fernando and San Gabriel, which form the second terrace, are the Sierra Madre Mountains. The average height of these mountains in Los Angeles County is about 5,000 feet. Their highest point in this county is Mount San Antonio, commonly known as Old Baldy, which has an altitude of over 9,000 feet. These mountains are very precipitous on their southern slopes, but have a gentler slope on the northern sides.

The third grand terrace includes all that part of the Mohave Desert known as the Antelope Valley, lying between the Sierra Madre on the south and the Sierra Nevada on the north and west. The east line of Antelope Valley is defined by the Lovejoy Buttes, a spur of detached hills from 150 to 250 feet high, which run northeasterly from the Sierra Madre. Antelope Valley is about 60 miles long east and west by some 25 miles wide north and south. The surface of the valley has a general slope to the northeast. The average altitude of the valley is 2,200 feet above sea-level.

The Sierra Nevada, which constitutes its northern and western boundaries, is a chain of great peaks and mountain ridges, which come down the eastern boundary of the State, at an average altitude of 7,000 feet.

There are no lakes of any size in Los Angeles County. Elizabeth Lake, near the southwestern part of Antelope Valley, consists of three separate bodies of water, which are connected with each other by small streams. The total surface area is about four square miles. There is another small lake in a granite basin of the Sierra Madre, about opposite and north of Pasadena. It has a surface area of a mile or two square. Occasionally, during the winter, its waters overflow into the west fork of the San Gabriel River.

The soil of the valleys at the base of the Sierra Madre range is composed largely of decomposed granite, in many places forming a sharp sand with an admixture of alluvial soil. At the base of the mountains is a wide stretch of mesa land, reddish in color, a sandy loam with a depth of 10 to 80 feet. These mesas are thought to be remains of a vast plateau that once covered the whole valley, but which have been washed down by the storms of ages. The rivers have washed away this red soil, except upon the higher mesas, and left on the northern portion gray and blackish granite loams underlaid by enormous gravel beds, in which are found heavy bodies of artesian water. At San Gabriel a mixture of granite and red loam is found. At Pasadena and on the higher bench lands there is a larger proportion of sand and gravel; on the Alhambra tract a heavier soil prevails. At Westminster, Anaheim, and some other points there are coast flats several miles in width, sloping gently to the sea. The upper valleys possess all grades of alluvium, and have also in some places a black adobe, which is largely composed of dead vegetable matter. The soil in the lower valleys consists of a rich alluvial deposited by streams in past ages, varying according to the amount of sand or clay it contains; on the mesas (tablelands) is largely found a soil composed of debris washed from the mountains, mixed with vegetable accumulation. This makes an excellent fruit soil. This vast range of its soil, altitudes, and other conditions, makes practicable the successful culture of all kinds of fruits, vegetables, or grains that can be raised north of the tropics.

So much has been written about the climate of Los Angeles that it has become an oft-told tale, but it is to its climate more than to any other one thing that Los Angeles, in common with all Southern California, owes its success in the horticultural field. There is a great diversity in the climate here between the coast and the interior.

Says Dr. H. S. Orme: "On the coast the atmospheric humidity varies from 69 to 75 per cent during the winter months, and from 60 to 68 per cent during the summer months. Twenty miles inland the humidity is much diminished, and 100 miles from the coast the percentage varies from 30 to 50. Foggy nights and mornings occur during the change of seasons, the fog rolling in from the sea through the passes and valleys, but seldom reaching ground elevated 1,000 feet, nor extending far from the coast."

During the decade from 1877 to 1888, inclusive, there were but thirteen days on which the temperature rose to, or exceeded, 100°, and eight days on which it fell to 32° or below. The average number of days, annually, on which the temperature exceeds 90°, is only fifteen. The highest recorded temperature was 108.5°, in September, 1885, and the lowest, 28°, in February, 1883.

The following table gives the highest, lowest, and mean temperature, by months, for the past fourteen years:

	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
January—								
Highest		72.0	73.7	76.0	71.0	74.2	82.0	78.0
Lowest		37.0	36.0	30.0	37.0	32.0	30.0	33.7
Mean		54.9	52.2	51.3	51.7	49.4	53.5	53.9
February—								
Highest		71.0	80.5	70.5	86.0	76.7	82.0	81.0
Lowest		41.0	38.6	33.5	42.5	32.0	28.0	38.5
Mean		55.0	55.5	50.1	57.9	50.3	52.3	55.1
March—								
Highest		76.0	79.0	73.5	89.0	87.8	84.0	72.5
Lowest		41.0	42.5	36.0	37.0	35.3	42.6	37.0
Mean		56.0	58.5	51.1	55.8	55.3	56.7	54.8
April—								
Highest		80.0	88.5	83.0	94.0	80.0	89.0	80.0
Lowest		41.5	42.2	40.0	48.0	40.2	39.0	41.5
Mean		57.8	58.7	55.9	61.4	56.4	57.3	57.2
May—								
Highest		89.0	97.0	97.0	89.3	86.1	100.0	79.0
Lowest		47.0	43.0	42.0	41.0	42.1	39.5	47.0
Mean		62.2	61.0	61.1	62.7	61.7	62.1	61.6
June—								
Highest		81.0	103.5	83.0	88.0	87.1	100.0	96.0
Lowest		47.0	50.5	50.0	48.0	49.6	52.0	49.5
Mean		65.0	65.8	63.4	65.5	64.4	68.8	65.6
July—								
Highest	93.0	88.0	84.5	85.0	85.1	98.1	90.0	99.0
Lowest	55.0	52.0	52.0	52.0	52.1	52.3	52.5	51.5
Mean	71.1	67.7	64.8	64.2	68.8	68.0	69.8	70.2
August—								
Highest	87.0	89.0	97.5	87.0	99.8	98.9	98.0	101.5
Lowest	56.0	54.0	53.0	52.0	52.1	57.0	50.0	52.5
Mean	70.0	68.7	69.5	66.4	69.4	71.0	69.8	71.3
September—								
Highest	93.0	103.0	101.0	91.0	102.0	100.0	103.5	92.5
Lowest	52.0	50.0	47.0	44.0	50.0	46.0	53.0	45.5
Mean	69.6	65.6	67.2	64.5	67.9	67.6	71.9	65.5
October—								
Highest	80.0	91.0	96.5	89.0	82.3	88.0	83.0	89.1
Lowest	43.0	43.0	42.5	44.0	43.0	44.0	43.5	42.9
Mean	63.0	63.1	64.3	62.0	60.9	63.0	61.0	62.3
November—								
Highest	86.0	81.0	84.5	85.0	80.8	81.0	84.0	88.0
Lowest	45.0	37.0	36.5	35.0	34.2	36.0	42.0	38.7
Mean	62.1	58.3	55.2	55.5	57.5	57.3	59.2	59.6
December—								
Highest	81.0	88.2	76.0	80.0	79.3	82.0	80.0	75.6
Lowest	36.5	30.0	30.0	38.0	35.3	35.0	37.0	45.5
Mean	56.0	54.4	51.9	55.6	54.7	56.4	56.3	52.3

	1885.	1886.	1887.	1888.	1889.	1890.	1891.
January—							
Highest	71.6	75.3	79.6	71.0	71.0	67.0	80.0
Lowest	38.0	32.0	33.1	30.9	32.0	34.0	34.0
Mean	53.9	54.7	65.4	50.0	52.0	49.0	56.0
February—							
Highest	81.0	81.0	81.5	73.5	84.0	81.0	71.0
Lowest	36.3	41.1	35.4	39.2	33.0	35.0	73.0
Mean	56.6	59.5	51.6	54.4	56.0	54.0	53.0
March—							
Highest	85.1	76.0	85.0	79.0	81.0	81.0	82.0
Lowest	42.3	37.2	41.1	35.9	44.0	40.0	40.0
Mean	60.6	54.3	59.1	55.1	59.0	58.0	58.0
April—							
Highest	88.6	80.0	87.0	99.0	93.0	94.0	86.0
Lowest	44.8	42.3	40.3	44.0	46.0	42.0	42.0
Mean	61.9	57.2	59.1	61.9	62.0	59.0	59.0
May—							
Highest	80.0	89.0	92.0	83.0	94.0	96.0	74.0
Lowest	48.6	44.2	44.5	45.0	46.0	43.0	47.0
Mean	63.5	62.4	.63.1	60.8	63.0	63.0	62.0
June—							
Highest	90.1	91.6	100.1	94.0	81.0	105.0	89.0
Lowest	47.0	48.2	46.7	50.5	51.0	48.0	49.0
Mean	65.0	66.1	66.1	67.5	66.0	68.0	66.0
July—							
Highest	98.5	98.1	98.1	95.0	99.0	97.0	109.0
Lowest	52.4	50.4	51.1	49.0	54.0	55.0	54.0
Mean	70.0	69.7	69.5	67.9	71.0	73.0	74.0
August—							
Highest	105.6	98.1	93.6	97.0	95.0	98.0	96.0
Lowest	51.2	53.7	52.1	51.3	55.0	56.0	54.0
Mean	72.7	71.8	68.5	67.6	72.0	73 0	75.0
September—							
Highest	106.5	91.3	91.0	98.2	103.0	94.0	100.0
Lowest	51.2	48.3	49.2	55.0	52.0	54.0	52.0
Mean	60.5	65.6	68.2	68.4	73.0	71.0	73.9
October—							
Highest	102.3	82.2	93.2	98.0	89.0	99.0	89.0
Lowest	41.6	41.1	47.2	44.0	50.0	46.0	46.0
Mean	64.8	59.3	65.0	61.9	66.0	68.0	66.0
November—							
Highest	78.5	84.9	86.0	84.0	82.0	96.0	85.0
Lowest	40.3	34.1	38.8	40.0	43.0	41.0	40.0
Mean	59.5	56.6	60.0	57.0	62.0	66.0	61.0
December—							
Highest	82.0	84.8	73.2	79.0	68.0	82.0	......
Lowest	40.3	37.3	35.2	41.0	40.0	43.0	......
Mean	57.9	55.7	53.7	55.0	54.8	61.0	......

The following table shows the monthly, annual, and average precipitations, including deposits from fog and dew, in inches and hundredths:

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Ann'l.
1878	3.33	7.68	2.57	1.71	.06	.07	.00	.00	.00	.14	.00	4.70	20.86
1879	3.59	.97	.49	1.19	.24	.03	.00	.00	.00	.93	3.44	6.53	17.46
1880	1.33	1.56	1.45	5.06	.04	.00	T.	T.	.00	.14	.67	8.40	18.65
1881	1.43	.36	.06	.46	.01	.00	.00	T.	T.	.82	.27	.52	5.53
1882	1.01	2.66	2.66	1.83	.63	T.	.00	.00	T.	.05	1.82	.08	10.74
1883	1.62	3.47	2.87	.15	2.02	.03	T.	.00	.00	1.42	.00	2.56	14.14
1884	3.15	13.37	12.36	3.58	.39	1.39	.02	.02	T.	.29	1.07	4.65	40.39
1885	1.05	.01	.01	2.01	.06	T.	T.	T.	.05	.30	5.55	1.65	10.60
1886	7.78	1.41	2.52	3.32	.01	.11	.27	.21	.11	.02	1.18	.26	17.20
1887	.20	9.25	.29	2.30	.20	.07	.07	T.	.18	.17	.80	2.68	16.27
1888	6.04	.80	3.17	.12	.05	.01	.04	.10	.03	.40	4.02	6.26	21.04
1889	.25	92	6.48	.27	.65	.00	T.	.68	.00	6.96	1.35	------	12.69
1890	7.83	1.36	.06	.22	.03	.02	T.	.03	.06	.03	.13	2.32	------
1891	.25	8.56	.41	1.26	.31	.00	T.	.00	.06	.00	.00	------	------

T indicates inappreciable precipitation.

Los Angeles is well supplied with irrigating facilities. At Pomona the old settlement ditch, with a capacity of 100 inches, covers a large portion of the old settlement; this is supplemented by the Pomona Land and Water Company's Pomona ditch, the whole covering an area of about 6,000 acres. In the neighborhood of Pomona are the Fleming & Roher works, for which the water is obtained by a tunnel at the base of San Antonio; the Packard works, which derive their supply from artesian wells in the artesian belt above Pomona. At San Dimas the water supply is derived from the cañon of the same name, and is controlled by the San José Rancho Company. At Glendora the water supply is derived from the Big Dalton Cañon, and covers an area of some 800 acres. South and east of San Gabriel Cañon is the Azusa irrigation neighborhood. The old Azusa, or Dalton, ditch serves the land of the Azusa Rancho and the lands of the old settlement.

The three old ditches, the Azusa, Duarte, and Beardslee, receive their waters by a tunnel driven 796 feet through solid rock. This tunnel is 6 feet high, 5 feet wide, and its ceiling arched.

At Duarte the waters of the San Gabriel River are diverted at the opening of the cañon by the Duarte Mutual Irrigation and Canal Company and the Beardslee Water Ditch Company.

Monrovia and Santa Anita get their supply from Sawpit Cañon, the water of which is equally controlled by the Santa Anita Water Company and W. L. Bradbury. The total output of this cañon is between 65 and 85 inches. Beyond Sawpit Cañon is Little Santa Anita Cañon, the flow from which is divided between the Santa Anita Rancho and the Sierra Madre Water Company. Besides these works, the San Gabriel Valley is watered by supplies from Davis, Eaton, Rubio, and Los Flores Cañons and minor sources. The supply from these is largely increased by the development of the flow from cienegas, natural springs, and artesian wells.

At San Fernando, the low-water flow of the Pacoima Cañon is all claimed by the San Fernando Land and Water Company. Their water is obtained by means of a submerged dam, and is conveyed to their lands by a pipe system. Other companies claim the water of San Fernando and Mormon Cañons. In the Los Angeles district, water is derived from the Los Angeles River. The water is owned by the city and sold by it to the irrigators.

The Santa Ana River leaves San Bernardino County, passing through the Santa Ana Cañon, and for 10 or 12 miles out of the cañon it is flanked by two of the most important irrigation districts in Southern California. That on the south, embracing the well-known towns and neighborhoods of Orange and Santa Ana, is served by the Santa Ana Valley Irrigation Company's canal, and that on the north and west sides of the river by the several works of the Anaheim Union Water Company, whose district is best known by the general name of Anaheim. In addition to these there is an old independent work on the north side, known as the Yorba Ditch, which serves the county within 2 or 3 miles of the mouth of the cañon. These include the principal irrigation works of the county. Connected with them are innumerable service ditches and minor systems.

Los Angeles, centrally located in Southern California, is, of course, in the heart of the citrus section, and one of her principal horticultural industries lies in the direction of citrus growth. While it is upon this branch of horticulture that the reputation of Los Angeles County is built, the soil, climate, and topography of the county fit it for excellence in the production of a long line of other fruits.

The orange does especially well in the San Gabriel Valley, at Pasadena, at Pomona, and the intervening country. Of the output of oranges for the year 1891, Pomona contributed ninety-seven carloads, nearly 1,000 tons of fruit. The citrus industry had its origin in Los Angeles County, at San Gabriel, where, in 1771, the Mission Fathers first established a settlement in the county, and immediately planted their orchards, in which the orange found a prominent place.

In 1831 the first orange orchard was planted in the city of Los Angeles by Jean Louis Vignes. He obtained the trees from the San Gabriel Mission, where a good orchard had flourished for more than a generation. Twenty years later his trees were yielding about 6,000 oranges a year. Some time later the late D. B. Wilson went quite extensively into orange culture in San Gabriel Valley, and the late Wm. Wolfskill set out the first large orchard in Los Angeles, where the Arcade depot now stands. Small orchards were planted in various parts of this section, but it was in the last years of the decade ending in 1870 that the first effort to make orange growing a distinctive industry in that section was undertaken by the late Judge North, the founder of Riverside. From that time up to the present the development of the industry has been more or less continuous. From 1880 to 1884 there was great activity manifested in planting more orchards; but about this time the appearance of the white cottony cushion scale, and the ravages already wrought by the red scale, acted to check the setting out of trees. The insect pests that attacked the orange groves in this section were as strange a dispensation as ever was chronicled in the history of any enterprise on record.

About 1880 the yellow scale made its appearance in this county at Sunny Slope. It came from Australia on some imported trees. A few years later the white cottony cushion scale (*Icerya purchasi*) made its appearance almost simultaneously at a dozen places in the county. For years the most indefatigable war was maintained against the two pests. Horticulture was a new business to the most of the orange growers, and the strange nature of these pests made them formidable to the most intelligent and most experienced men in the business. All sorts of washes, sprays, and gases were tried, but to little practical avail. The trouble with them was that all parts of the tree could not be reached, and whenever a bug was left he increased and multiplied after the law of his kind so rapidly, that before an orchard of five acres could all be treated those trees first sprayed were again infested. All sorts of methods were tried, and it was alleged that the carelessness of the growers was largely at fault. Of course, great care kept the trees clean for awhile, while neglect allowed the bugs to spread over an orchard in a month. Many intelligent people thought some remedy would grow out of natural laws by which the destructive parasites would be swept away. There were many reasons for such a hope, but hope deferred makes the heart sick in this as in other affairs. During the summer of 1888 there seemed to come a ray of hope. The white scale bug died from some cause, so that millions of the pest perished from the trees. Orchards which had been covered as if with snow became partially clean. But some other remedy had to be found, or the pest might return and the orchards be lost. It was at this time that the *Vedalia cardinalis* was introduced, and its work was magical. The cottony cushion scale is gone, and the orchards this pest had well nigh destroyed are rejoicing in a new and vigorous growth that is manifest to the eye as far as the orchards can be seen. The *Vedalia cardinalis* is here, while the scale has been destroyed. The new-comer has become thoroughly acclimated, and has taken up his home here, and the orange growers bid defiance to their great enemy, the cottony cushion scale.

The yellow scale, too, has disappeared from the orchards of this section. This scale also attacked trees in Australia and Japan many years ago, and for a time threatened the very existence of the industry in those countries. During the past few years this pest has slowly disappeared from the trees there, and now the grower thinks little of its depredation. The same thing has taken place here. Several parasites have attacked this one, and the yellow scale disappeared to a large extent from all the orchards in this section.

Not so much attention has been given to lemon growing as has been paid to the orange; enough has been done, however, to show that in many parts of Los Angeles County the lemon will grow beside the orange. The orange has heretofore been the favorite citrus fruit for several reasons. It is much more hardy than the lemon, standing a degree of temperature below the freezing point that would destroy the more tender lemon; it flourishes on soil that would not suit the lemon, which is more fastidious, and there has been a large demand for the entire output of oranges at large prices. This array of facts has turned the greater part of the attention of citrus growers to the orange, and left the lemon in comparative neglect. Experience, however, is demonstrating the fact that the lemon is a very profitable crop, that it has many advantages that the orange does not possess, and that there are large areas of land in Southern California and in Los Angeles County where it will do well. The result of this is that in the past year or two much more attention is being paid to this valuable fruit, and large tracts are now being set to it.

What has been said of the lemon is true to a great extent of the lime. Some years ago the lime occupied a prominent position among the citrus orchards of Los Angeles, and gave promise of becoming an important factor in the horticultural history of Los Angeles; but a series of cold years in which the trees were nearly all frozen discouraged the growers, and but little attention has since been given to it. There are, however, many places in this county where the lime flourishes, and where it does it is very profitable.

During the past few years considerable attention has been given to olive growing in Los Angeles County, and especially in the vicinity of Pomona large tracts of land have been set to this fruit. Already Pomona pickled olives have established for themselves a reputation in the market, and last year the manufacture of oil was begun. As the olive orchards here are all in their infancy as yet, each year will necessarily see the output increase and the industry grow steadily in importance.

Where attention has been paid to it, the fig has proved a profitable crop, the soil and climate of many parts of Los Angeles County seeming especially suited to its development.

The whole line of deciduous fruits do well, and peaches and apricots yield very large returns. Nuts of fine quality, especially almonds and English walnuts, attain their perfection in this county, and the last named form an important item in the products of the county.

So far the growing of English walnuts in this part of the State has been satisfactory, and as the industry becomes better known it grows in popularity. About a dozen ranchmen in the vicinity of Downey and Rivera report profits on last year's crop ranging from $300 to $350 per acre. It further appears that they realized not less than $300 per acre for the past eight or more years. We are also told that there are some twenty men at Downey who do not get less than $225 an acre for their crop.

The Pomona "Progress" says that the English walnut crop of California amounts to a million and a half pounds, and is growing very rapidly. This crop represents a total income to the growers of about $170,000, fully five sixths of which is credited to Los Angeles and Santa Barbara Counties. The trees are wonderfully sure bearers, and appear to grow with great vigor most anywhere in Southern California. It is therefore easy to understand why so many are being planted. They do exceedingly well in the vicinity of Santa Monica. Mr. Boyer, who owns a ranch in the Ballona, has a number of trees that are only five years old, from which he gathered 150 pounds to the tree last season. This is in the low, damp lands. The growth seems to be equally satisfactory in the foothills, and the upland ranches are planting quite extensively. A test was also made last year in the cañon. J. A. Pritchard, who is a local agent of Senator Jones, planted quite an area in Sepulveda Cañon, near the big reservoir of the Soldiers' Home. They made a surprising growth last year, and show as much vigor and health as one can see anywhere. Much of the large area of land now sown to grain will no doubt, within a few years, be planted to walnuts, as also will the cañons and foothills.

Through the courtesy of their Secretary, Mr. J. A. Montgomery, we are enabled to give the names of members of the Los Nietos and Ranchito Walnut Growers' Association, number of sacks of walnuts each had, the weight, and also amount of money each received for the same, viz.:

Name.	Sacks.	Pounds.	Amount Received.
T. R. Parsons	100	10,267	$850 07
J. C. Perkins	102	10,963	913 28
Mrs. H. S. Flora	245	26,650	2,190 04
William Moss	260	28,075	2,281 85
A. Dorman	335	36,245	2,967 05
J. P. Fleming	120	12,823	1,053 84
J. H. Martin	82	8,956	735 38
J. W. McGaugh	75	7,952	651 02
G. W. Maxson	47	5,067	415 60
J. H. Davis	29	2,837	235 88
O. P. Passons	225	[illegible]3,960	1,952 91
E. Poyoreno	171	19,609	1,595 61
T. L. Gooch	206	23,060	1,895 54
James Root	33	3,687	299 36
S. G. Reynolds	55	6,209	504 46
James M. King	80	8,649	713 07
John Tweedy	178	18,778	1,549 29
G. W. Cole	74	7,907	717 93
J. J. Tweedy	1,691	7,493	1,505 40
H. W. Judson	164	17,416	1,446 33
William Caruthers	113	12,379	1,047 24
H. Sarrasin	34	3,698	299 98
William Wood	4	396	32 67
J. J. McClelland	71	8,113	666 71
James Stewart	58	5,937	480 62
Cyrus Brown	23	2,331	192 32
A. H. Dunlap	212	22,365	1,853 18
J. D. Durfee	86	9,111	741 03
Mrs. F. A. Ardis	51	5,579	458 34
D. W. Cate	127	12,788	1,143 68
Harry Moss	54	5,362	482 62
J. Clay	68	7,499	619 03
C. A. Coffman	155	15,923	1,425 79
H. L. Montgomery	535	54,999	4,541 16
T. M. Passons	291	30,359	2,507 48
John Bangle	269	27,344	2,406 30
R. M. Fuller	120	12,763	1,067 92
Mrs. S. J. Boyd	291	31,496	2,637 53
L. L. Bequette	332	34,016	2,844 41
Wilbur Cate	111	11,018	972 40
J. T. Rankin	94	10,310	840 19
J. W. Standlee	31	3,248	267 97
P. G. McGaugh	215	22,589	1,648 22
D. White	68	7,040	530 05
James Barlow	122	13,151	1,071 75
William Story	80	9,328	670 15
C. S. Sanderson	50	5,550	399 85
P. O. Johnston	38	4,117	294 41
M. Holbrook	144	14,918	1,228 12
S. B. Root	11	1,211	85 39
John M. King	11	1,108	80 33
Totals	8,141	692,649	$58,010 75

Walnuts are usually graded in two sizes and packed in 100-pound sacks. The prices paid last year were:

Soft-shell, first grade	9 cts. per lb.
Soft-shell, second grade	8¼ cts. per lb.
Hard-shell, first grade	8½ cts. per lb.
Hard-shell, second grade	7 cts. per lb.

This season's crop is reported as very large and selling at an advance over last year's prices. Besides walnuts, Rivera grows a large amount of citrus fruits, which are shipped East, and deciduous fruits, which mostly find their way to the local cannery. Prices paid by the cannery this year have been: for peaches, $25 per ton; for pears, $20, delivered.

At Pasadena the principal growth is in citrus fruits, with some peaches, prunes, nectarines, and other varieties. The crop of oranges for 1892 was very light, owing to a severe wind which swept over the whole of Southern California in November of last year. The outlook for the present season, however, is very excellent, and if no unforeseen contingencies arise to cause a shortage the crop of 1893 will be very large. Peaches have yielded a full crop, but a shortage is reported in prunes and apricots.

A very excellent showing in favor of the grower is made in the advance of prices this season, as will be seen from the following statement of prices paid at Pasadena for dried fruit last season and this:

	1891.	1892.
Peaches, per pound	7c.	12½c.
Prunes, per pound	6c.	10c.
Apricots, per pound	5c.	12c.

A very material increase in the acreage of fruit in the Pasadena section has been made during the present year, a careful estimate showing the following:

	Acres.		Acres.
Apple	109	Orange	136
Apricot	2	Nuts—Almond	7
Cherry	25	Walnut	3
Fig	25	Pear	11
Peach	300	Olive	10
Prune	210		
Nectarine	2	Total	885
Lemon	45		

Pomona is one of the most important fruit sections of Los Angeles County, and produces a wide range of fruits, including, in order of importance, oranges, lemons, prunes, peaches, apricots, wine grapes, Seedless Sultanas, pears, blackberries, olives, and figs. The principal markets are Los Angeles and San Francisco. A great deal of fruit is shipped direct to the East—Chicago, Philadelphia—and much is also sent to New Mexico and Arizona. Henry H. Wheeler, who puts up an extra fine quality of fruit in fancy packages, reports having sold his pack at the following prices:

Dried apricots: 25 cents per lb.
Dried peaches, peeled: 30 cents per lb.
Dried peaches, extra: 40 cents per lb.
Dried prunes: 20 cents per lb.

These packs netted Mr. Wheeler 3 to 4 cents less than the figures quoted.

Pomona reports large crops of apricots and peaches, but not so large as that of last year. Prunes short, but the fruit extra fine; olives not so abundant as last year; oranges very good; lemons short. There was an immense crop of blackberries, and a very large yield of grapes. The ruling prices this season, delivered, were:

Apricots: Nearly all at $20 per ton; few at $15; few at $25.
Peaches: $15 to $45 per ton, for from poor to finest kinds.
Prunes: Great many at $50 per ton; some at $30, early in season.
Olives: A local buyer is offering $80 per ton.
Wine grapes: Offering $8 per ton; but growers have agreed to sell for $14, or dry them.
Blackberries: Three to 4 cents per pound.

The acreage in the Pomona district set to fruit this season is:

	Acres.		Acres.
Apple	10	Lemon	206
Apricot	70	Orange	1,252
Cherry	1	Nuts—Almond	2
Fig	48	Walnut	165
Olive	148	Chestnut	1
Peach	61		
Prune	318	Total	2,306
Pear	24		

At La Cañada, La Crescenta, and Monta Vista, apricots, peaches, prunes, pears, and wine grapes are the prevailing fruits. These are mostly boxed and shipped green to the East. The first carload of green apricots from Southern California to the East was shipped from J. Minott Ward's ranch, in La Cañada, on July 28th, consigned to Chicago.

The area of new land set to fruit in this section in 1892 was:

	Acres.		Acres.
Apple	7	Orange	15
Apricot	7	Walnut	3
Fig	7		
Olive	3	Total	50
Lemon	8		

In the district around Verdugo—Glendale, West Glendale, and Tropico—the orchard products are, in order of importance, peaches, apricots, oranges, lemons, pears, prunes, grapes, and berries. These are usually disposed of to local dealers. The crop for this season is reported as light for all classes.

The acreage of new fruit planted this season in this district is:

	Acres.		Acres.
Apple	5	Prune	11
Apricot	10	Lemon	10
Fig	6	Orange	13
Olive	5	Walnut	7
Peach	10		
Nectarine	6	Total	83

Cahuenga Valley is not a regular fruit section, but still it produces largely both citrus and deciduous fruits, and is especially adapted to the apricot. All fruit in the district, except prunes, returned a full crop this season. The acreage set at Cahuenga this season is:

	Acres.		Acres.
Apricot	11	Walnut	7
Pear	6		
Lemon	10	Total	42
Orange	8		

Eagle Rock Valley is a comparatively new fruit district, and the greater part of its orchards have been planted in the past two years. In the spring of 1892 there was set out the following acreage:

	Acres.		Acres.
Olive	30	Table grapes	20
Prune	20	Strawberries	2
Pear	25	Raspberries	2
Plum	25	Blackberries	5
Lemon	20		
Orange	40	Total	194
Walnut	5		

San Fernando is rapidly assuming an important position as a citrus fruit section, and some fine fruit is already shipped from there. The crop this season is promising well; trees are heavily laden and the fruit of superior size. The new acreage there and in the other principal sections of Los Angeles, is as follows:

Variety.	San Fernando.	Whittier.	Burbank.	Long Beach.	Rivera.	Downey.
Apple	21	20	242	46	8	31
Apricot	11	8	199	4	6	7
Cherry			3	1		
Fig	12	76	70	20	15	20
Olive	8	41	65	27	43	
Peach	3	45	365	31	35	6
Prune	100	25	295	5	11	52
Pear	8	25	420	10	11	
Plum	1	20	40	12		2
Lemon	40	25		7	24	6
Orange	50	195	21	8	215	220
Nuts—Almond		2	3			
Walnut	14	503	1,400	64	575	703
Raisins	6					
Table grapes	8					
Totals	282	985	3,123	235	943	1,057

Acreage and Variety of Fruits in Los Angeles County.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	882	629	1,511	99
Apricot	1,774	1,125	2,899	333
Cherry	18		18	
Fig	549	424	973	119
Olive	415	373	788	233
Peach	2,191	1,868	4,059	720
Nectarine	30	6	36	5
Prune	1,724	1,701	3,425	902
Pear	778	883	1,661	352
Plum	147	160	307	92
Quince	16		16	
Lemon	556	1,217	1,773	696
Orange	7,387	4,910	12,297	3,352
Nuts—Almond	57	50	107	50
Walnut	1,752	3,779	5,531	1,269
Chestnut	6		6	
Raisins	671		671	
Table grapes	1,182		1,182	
Small fruits	331		331	
Totals	20,472	17,122	37,594	8,724

MARIN COUNTY.

Marin County is a peninsula separated from San Francisco by the Golden Gate, and approaching within a mile and a half of the latter county at its nearest point. It is surrounded on three sides by water—on the east by San Pablo and San Francisco Bays, on the south by the Golden Gate and the Pacific Ocean, and on the west by the Pacific Ocean. Sonoma forms its northern boundary. Altogether Marin possesses a longer coast-line than any other county in the State. Its area is 509 square miles, or 325,000 acres.

The topographical features of the county are rolling hills and numerous small valleys. A part of the Coast Range crosses Marin in a northwesterly and southeasterly direction, and much of the surface of the county is broken and hilly, and a considerable portion immediately on the shore is composed of marsh and overflowed lands. The highest land in the county is Mount Tamalpais, which has an elevation of 2,608 feet.

Marin County has two distinct climates, which may be named the coast and inland climates. Between these there is a remarkable difference, and one that can hardly be realized when it is understood that they are separated from each other by a low mountain range scarcely 3 miles across. On the ocean side of this range fogs, chilling winds, and disagreeable weather are common, while on the inland side sunshine, warmth, and spring-like salubrity prevails.

On the inland side is San Rafael, the county seat of Marin, which enjoys climatic advantages unsurpassed in the State. Its nearness to San Francisco is apt to interfere with a just appreciation of its advantages in this respect, as those who are unacquainted with the facts cannot believe that there can be so great a difference in the climate of two places so near together. Its range of temperature is not great, the air is dry, and during nine months in the year there is little if any wind. During March, April, and May there are occasional heavy winds.

Following is a summary of the weather at San Rafael for one year, from observations taken at 2 P. M. daily:

Month.	Mean Temp.	Clear Days.	Cloudy Days.	Rainfall.
June	74	29	1	.00
July	79	30	1	.00
August	76	28	3	.00
September	74	28	2	.00
October	70	28	3	1.29
November	65	19	11	1.08
December	52	5	26	11.43
January	52	23	8	11.81
February	57	16	12	3.20
March	56	11	20	4.97
April	65	20	10	2.45
May	69	23	8	.62
Totals	66	260	105	36.85

The following table of average rainfall, compiled from observations covering a series of years, will show the difference in precipitation at various points in Marin County, and also the months of the year in which rain is likely to occur. These tables of average rainfall do not give an idea of the number of clear months in the year, as they do rainfall in June and September, when there are many years in which no rain falls in those months, and some in which May and October are dry. The rainy season is included in the months of November and April:

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Point Benito	4.96	4.59	3.83	2.76	1.05	.48	.00	.00	.31	1.61	2.76	3.04
Point Reyes	3.38	3.15	2.62	2.04	.65	.28	.00	.00	.04	.54	2.09	2.77
San Rafael	9.77	6.29	6.05	3.77	1.34	.47	.00	.00	.39	2.59	4.52	4.39

The soil of Marin County varies from the rich adobe clay of the salt marshes, to the sharp, gravelly loam of the higher foothills. In the valleys it is composed of heavy black loam with an admixture of gravel; in the foothills a reddish loam prevails, sharper, and carrying less adobe. It is all easily worked, heavily charged with the elemental constituents of plant life, admirably suited to horticultural purposes, and wherever worked to fruit yields heavily.

Irrigation is not required. The depth of the soil, its retentive nature, and ample rainfall in the winter months, render artificial watering unnecessary.

The principal industry of Marin County is dairying, but of late years much attention has been paid to fruit growing, and large areas of land have been set to orchards. Some of the finest apples grown in the State are produced in Marin County. On the dairy lands of the Novato Ranch there are 10 orchards. On every rented subdivision of this, and the Burdell Ranch, they are growing apple, pear, quince, fig, pomegranate, persimmon, apricot, peach, plum, and other fruit trees, the thrifty growth and large yield from which proves the superior adaptability of the soil and climate of this portion of Marin County to fruit growing.

On the Novato Ranch, the property of Hon. Frank C. DeLong, is one of the largest fruit orchards, including one of the oldest and most celebrated apple orchards, in the State. This orchard contains 250 acres, with 40,000 trees, of which 22,000 are apple, 2,000 apricot, 3,500 pear, and the remainder mixed fruits, including peaches, plums, cherries, English walnuts, almonds, and figs. There are also 200 acres of vineyard planted to Mission and Zinfandel grapes. The fruit from this ranch suitable for canning is taken by the Petaluma Canning Company. The apples are carefully sorted, and the best are packed in boxes and shipped to Australia, where they obtain the highest price, the reputation of this orchard being established at the antipodes. The smaller apples are used for cider and vinegar. Berries are grown to some extent and have proved profitable.

The land in Marin County is generally held in large tracts, and rented out for dairying purposes. It is very profitable in this way, and as a result there is but a sparse population, and but little advance is made in horticulture, although the greater part of the county is eminently fitted for this industry.

The DeLong orchard is the oldest fruit farm in Marin County. It was planted in 1857, and has been in continuous bearing from the beginning. No extensive amount of planting has been done in Marin County during the past year. The crop outlook of this year is quite short. Apples will not return over one fourth the usual yield, pears not over half; peaches and apricots are reported average.

Acreage and Variety of Fruits in Marin County.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	470	16	486	5
Apricot	50	21	71	8
Cherry	12	3	15	1
Fig		3	3	1
Olive		1	1	
Peach	50	40	90	20
Prune	12	34	46	7
Pear	40	20	60	8
Orange		2	2	
Nuts—Almond	2		2	
Walnut		1	1	
Totals	636	141	777	50

On this area there are some 12,000 trees not yet in bearing, the remainder being in old orchards.

The chief fruit section of Marin is around Novato, although there are numbers of young orchards distributed over the county.

MARIPOSA COUNTY.

Mariposa County is triangular in shape, and is bounded on the north by Tuolumne County, on the south and east by Fresno County, and on the west by Merced County. Its area is 1,543 square miles, or 988,000 acres, mostly mountains and foothills. The county reaches eastward from the edge of the San Joaquin Plains across the foothills far into the Sierra Nevada Mountains, its altitude varying from 300 to 13,000 feet, Mount Dana, the highest point of land in the county, reaching an elevation of 13,227 feet.

The topographical peculiarities of Mariposa County strongly resemble those of El Dorado, Amador, and Calaveras. With its eastern extremities lying in the high Sierra, and its western portions embraced in the San Joaquin Valley, it is at once a mining and agricultural district. Its forests, too, are so extensive that lumber can be put down as its third important industry.

The Merced River and the waters of the Mariposa both take their rise in this county, the first by the time it joins the San Joaquin being quite an important stream. On the south the Chowchilla River forms the boundary between this and Fresno County, while numerous smaller streams flow westward into Merced County.

The county is scenically remarkable for containing the Yosemite Valley, which has been so fully described and illustrated that neither time nor space need be devoted to it here.

What has been said of the climate of other mountain counties will apply to Mariposa. In the higher altitudes the winters are characterized by almost arctic severity, while in the foothill region but little severe weather is known. In the summer the thermometer frequently reaches beyond the 100° mark, but usually the days are comfortable, the nights cool, and the whole salubrious.

The foothill soil of Mariposa is usually a sharp, red admixture of adobe and gravel, while in the valley regions a black alluvium is common. Much of it is a sharp decomposed granite, which works easily and is very fertile.

Mariposa is devoted more to mining than to horticulture, although of late considerable attention has been bestowed upon fruit culture. The diversified climate, varying all the way from semi-tropical near the edge of the plains to temperate on the higher foothills, produces all kinds of fruit, from oranges and citrons to apples and pears, according to the location. Some of the best apples that find their way to the San Francisco market are produced in Mariposa County. An orchard of 1,500 trees planted by James Lannon in the Yosemite Valley has been bearing for years and with good results. The fruit is very large and handsome in appearance and the yield abundant.

The agricultural and fruit interests of the county are steadily improving; thousands of acres are taken up by settlers every year, and there is yet considerable valuable land left for new-comers. Fruit raising promises to be a very important industry. None of the foothill counties, which are now rapidly showing their superiority over the rest of the State in this important department, have any advantage over Mariposa in soil, climate, or quality of production.

The orchards of Mariposa County are principally family orchards. P. P. & C. L. Mast have lately gone into fruit growing on a more extensive scale, and have 140 acres in orchard and vineyard at Coulterville. The trees are not yet in bearing, but they have made an excellent growth, and give promise of acting as the pioneers of more extensive plantings hereafter. Ninety acres of this orchard were planted last winter, the remainder the year previous.

The principal fruit sections of this county are Coulterville, Jerseydale, Darrah, and Grant Springs, and the fruits which prevail are apples, pears, prunes, plums, peaches, and berries, being given in order of importance. The output for 1891 was: apples, 7,000 boxes; pears, 500 boxes; of other fruits no record was kept.

The prospects for this season are not bright for a large yield. A late frost, general over the greater part of the State, visited Mariposa in blooming time, and as a result, except in the more sheltered nooks, the apple crop will not average over half the usual yield.

The oldest orchards in the county are those of Daniel Hutzell, August Olney, William Curtis, and J. Lindsey. In the Curtis orchard are apples and peach trees and vines, planted as early as 1856 by one Demarant.

There are no irrigation works in Mariposa. Where irrigation is resorted to it is the work of individuals. The water is taken by private ditches from the streams and used on the lands of the ditch owners. One of the most complete systems is that owned by P. P. & C. L. Mast, for watering their 140-acre orchard at Coulterville. This is an earthen reservoir 50x150 feet and 5 feet deep, which was constructed in 1890 at a cost of $150. Speaking of his method of irrigating, Mr. Mast writes:

"I have a dam in the Merced River, made in 1867 by the miners; from it is a ditch extending 2½ miles, at which point I have 26 feet fall, which runs a 13½-inch Leffel wheel; it propels one of Garrat's triple plunger pumps, No. 6½, and raises from 3,000 to 5,000 gallons an hour, 120 feet vertical, in a pipe-line 700 feet long (3¾-inch pipe). This irrigates my whole plant, except about 450 olive trees and a few almond trees, which are irrigated by another unimportant ditch."

Following is the total number of miles and value of ditches, mining and irrigating, in Mariposa County:

	Miles.	Value.
Irrigating ditches	22	$1,030
Mining ditches	94¼	5,390
Totals	116¼	$6,420

Thomas Davery, speaking of the vicinity of Darrah, says:

"We are at an altitude of 3,100 feet, with a southerly exposure. All of the fruit named grows to perfection, and all mature well; free from pests at present. In our locality the apple is a wonder, and the king of fruits, especially late kinds. Yellow Newtown Pippin and Lawver are the best here, and will keep sound and solid from November to July. The Easter Beurré pear keeps with us from November to March, and is a delicious pear. The Bartlett is a great yielder, and of the very best quality. Pears, peaches, prunes on peach roots, and grapes, grow here without water, with thorough cultivation."

Acreage and Variety of Fruits in Mariposa County.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	115	50	165	20
Apricot	15	3	18	1
Cherry	10	5	15	2
Fig	14	5	19	1
Olive	15	15	30	5
Peach	12	8	20	2
Nectarine		4	4	
Prune	10	15	25	10
Pear	20	8	28	2
Plum		2	2	
Lemon		10	10	3
Orange	20	8	28	2
Nuts—Almond	14	8	22	5
Walnut	8	4	12	1
Other nuts		4	4	
Raisins	40		40	
Table grapes	120		120	
Small fruits	2		2	
Totals	415	149	564	54

MENDOCINO COUNTY.

Mendocino County is bounded on the north by Humboldt and Trinity Counties, on the east by Tehama, Glenn, and Lake Counties, on the south by Sonoma County, and on the west by the Pacific Ocean. Its area is 3,780 square miles, or 2,000,000 acres. It has 100 miles of coastline. In general topography it is a mountainous county, with valleys lying between the mountain chains, or along the coast. It is one of the three great northern counties—Humboldt and Trinity being the others—

that embody the greater part of the northern Coast Range Mountains, taking in their highest peaks, their deepest cañons, their fertile valleys, wooded slopes, rushing rivers, and picturesque scenery. Mendocino County shares with Sonoma, Humboldt, and Del Norte the glory of the great redwood belt of the world.

From north to south, this county has a length of 85 miles. Its width east and west is 45 miles. The Coast Range of mountains, composed of two parallel ridges, traverses the central portion of the county for its entire length. These mountains vary in height from 1,000 to 3,000 feet. Their lower slopes have a gentle declivity, while the higher portions are generally precipitous and furrowed with ravines and gulches. In the eastern and northern portions of the county many small productive valleys are found.

The Eel River, running north, and the Russian River, running south, both have their source in this county, and are the principal streams. A large number of tributaries connect with them, while down the slope of the western ridge large numbers of creeks, some of which might aspire to the dignity of rivers, find their way to the Pacific. It will be seen that Mendocino is well watered with the numerous streams which take their rise in the mountain chain that intersect her territory.

The climate of Mendocino County varies with altitude and proximity to the ocean. On the immediate coast heavy fogs and strong winds are common, while the interior valleys escape these to a large extent, and the extreme heat of the summer months is very greatly modified by their influence. During the summer the thermometer will reach the 100° mark and occasionally touch 10° beyond, but this is unusual. Like other portions of the coast, the heat is not oppressive, and work can be prosecuted without extreme discomfort even during the hottest days. In the winter there are occasional frosty nights and mornings, and in exposed situations the mercury will sometimes, though not often, fall 20° above, and it is recorded that on one occasion in Round Valley it fell as low as 17°. The temperature will give a mean of 80° for summer and 40° for winter. The rainfall is in excess of that of most of the counties of California, averaging 31.50 inches per annum. The following table, prepared by George McCowen, D.D.S., of Ukiah, gives a very accurate account of the precipitation at that point from 1877 to 1891, inclusive:

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1877	7.38	4.70	2.14	.59	.35	.00	.00	.00	.00	1.50	4.58	3.59	24.83
1878	19.03	17.24	7.60	1.27	.27	.00	.00	.00	1.05	3.70	.00	.68	60.84
1879	4.44	6.17	14.47	3.36	2.56	.00	.00	.12	.60	.87	5.92	10.08	38.59
1880	5.03	2.17	4.45	11.78	1.84	.00	.00	.00	.00	.00	.15	12.27	38.19
1881	10.25	4.96	.70	1.80	.80	.00	.00	.00	.22	1.00	1.00	6.72	25.95
1882	3.41	5.87	4.06	1.92	.50	.00	.00	.00	.73	2.70	3.95	2.88	26.02
1883	2.88	1.25	3.62	5.21	2.71	.00	.00	.00	1.15	1.85	.64	1.31	20.62
1884	4.12	3.52	5.43	5.16	.43	1.01	.00	.01	.40	.76	.17	12.94	34.73
1885	2.51	1.91	.25	.43	.36	.14	.00	.00	.15	.53	19.11	5.43	30.72
1886	9.74	.23	2.96	6.43	.98	.00	.00	.00	.00	1.27	.86	4.43	26.90
1887	2.56	7.85	1.74	3.21	.41	.00	.00	.00	.30	.00	1.52	4.89	24.48
1888	10.29	2.07	3.87	.10	.23	2.13	.18	.00	1.51	.00	4.04	7.48	41.80
1889	1.04	.84	9.94	1.36	4.25	.15	.00	.00	.00	8 05	4.17	15.63	45.48
1890	14.74	5.00	9.47	2.56	.86	.00	.00	.00	.49	.05	.20	4.80	38.17
1891	2.13	10.38	2.44	2.59	1.10	.32	.28	.00	1.00	4.00	.88	.00	22.12
Av'ge.	6.64	4.92	4.87	3.14	1.28	.26	.03	.09	.54	1.66	3.55	6.65	------

From the above table it will be seen that the heaviest rainfall is in December, January, February, and March; that only four years in the fifteen was there rain in June, one year it rained in July, and two years in August.

Taken by seasons, the rainfall has been:

	Inches.		Inches.
1877-78	55.08	1884-85	20.87
1878-79	26.43	1885-86	45.50
1879-80	32.36	1886-87	22.33
1880-81	29.63	1887-88	35.78
1881-82	24.70	1888-89	30.66
1882-83	25.94	1889-90	60.48
1883-84	24.41	1890-91	23.08
Average rainfall per season			31.50

The land upheaval which formed the Coast Range, left between two of the mountain chains a string of lakes which are, in their geographical position as you travel to the north, the valleys known now as Sonoma, Sanel, Ukiah, and Redwood Valleys. Although the formation of these lakes is a matter of geographical history, their conversion into valleys is a matter of recent history. The erosion from the surrounding mountains filled these lakes with a deposit at a very early date after their creation; but the erosion has been deposited to such an extent during the last few years that the large trees situated at the bottom are in nearly every case buried many feet above their roots. If one will consider the original formation of these valleys, and will at the same time keep in mind what the mixture of certain soils will be when the natural chemical reactions have taken place, he will have no trouble in seeing in his mind the nature of the soils in Mendocino's valleys.

The land upheaval left the various strata of rocks, which are found in all out-croppings. The erosion from the mountains washed down into the valleys and, mixed with decayed vegetation of the country, made a loam deposit which is very thick, varying from 2 feet near the foot of the mountains to 30 feet in the middle of the valley. The soil which adjoins the loam deposit is what is known as black gravelly loam, mixed to a more or less extent with adobe.

Which of the two soils is the stronger is difficult to decide. The loam will produce more corn, while the black land will produce more and better fruit. Both will produce large crops of grain, but one will do about as well as the other.

Next back from the black soil is the hill land. The quality is uniformly thick brown soil, which is lighter than the other two and drier. This last described soil is little cultivated at present, save in a few instances.

In Ukiah Valley there is the greatest variety of soil on even a small tract. The river, and the many small streams which come from the mountains, have deposited sand, gravel, or alluvium. Speaking in a general way, there is a band of sandy loam along the banks of the river and larger creeks. Lying back of this and a little lower is a broad band of clay loam, very rich, but a little too rich for the best results. Rising still farther back is a sloping bench running to the hills, and oftener of light, yellow clay, and formerly heavily covered with brush. In some places this bench is deeply covered with coarse gravel. The lower hillsides are clayey and timbered. There are some large bodies of a black gravel formed by mountain streams, and this black gravel is the finest fruit land.

All of the best lands are under cultivation, and the benches will soon be cleared and tilled. Holdings are not large, 200 acres of valley land being an exceptional farm, and the tendency is to subdivision.

The soil in Yorkville Valley is a rich, black loam, and well adapted to the growing of vegetables, fruits, grains, and hops. The soil of the hillsides and mountains is well suited to the growing of grass, vines, and fruits, and some places grain.

Anderson Valley is a long, narrow strip of land lying between two chains of mountains. It extends 17 miles southeast and northwest, and is from 1 to 2 miles in width. The soil in this valley is rich alluvial, and well adapted to the growing of vegetables, fruit, and cereals. The soil of the hills is a rich, black loam, except in a few places where will be found adobe and gravel.

In Potter Valley the soil is mostly a sedimentary deposit, but a variety exists—some clay, a small amount of adobe, and some of the lands so famous in other parts of the State for fruit raising.

In Little Lake Valley the soil generally is a rich, sandy loam, but in a few places a black loam is found. The soil is very productive, and pays the tillers a liberal reward for their labors. Never in the history of the valley has there been anything approaching a failure.

On the subject of horticulture in Mendocino, Carl Purdy furnishes the following able article to the Ukiah "Republican Press:"

"Family orchards were put out by many of the early settlers of the county, and are still in bearing and vigorous. Lack of transportation and a limited home market were, for many years, drawbacks to any developments of the fruit business. Our small orchards everywhere over the county, in valley and on hillsides, in the redwood forest and on the coast, served to test the adaptability of soil and climate. It can be said that the apple and pear do well anywhere, the quality, however, being better in the redwood belt; that the peach and nectarine produce fruit of good quality in all but the immediate coast section, but that, except in a few favored spots, the certainty of yield and healthfulness of trees are not such as to induce planting to compete with such favored localities as the Sacramento Valley and the Tulare region; that the apricot is a total failure in nearly every place; that the plum and prune thrive and yield as nowhere else in California, and the Bartlett pear is of superior quality and productiveness; that small fruits have not been tested properly, but there is little reason to hope that they can be grown at all, at least not profitably. Olive trees are to be seen in many places in Ukiah and Sanel Valleys, but have not yet reached a fruiting age. In some of the warmer valleys figs thrive, while all through the southern portion of the county grapes grow as well as in Sonoma or Napa Counties.

"The great diversity of climate between the valleys on Russian River, the redwood region, the immediate coast, and the elevated valleys on Eel River, makes it imposible to treat the fruit business of the county as a whole. Outside of these variations there are differences in elevation and exposure to air currents which make small localities in each section altogether different from the surrounding country, as well as cause considerable diversity in sections that a casual judgment would pronounce uniform. The business of fruit growing in Mendocino County, to be presented successfully, demands a close study of all local conditions of elevation and air currents, as well as soil and moisture. I will now proceed to treat of the various belts and localities of the county.

"Those valleys lying on Russian River—Sanel, Ukiah, Redwood, and Potter, with smaller valleys or coves opening into them—have a very similar climate, and no great difference in altitude or amount of fog, excepting that Potter Valley lies higher, and is more subject to the cooling influence of the San Hedrin range.

"The first person to plant fruit largely was N. Wagonseller, at Ukiah, who commenced in 1873, and put out some 36 acres. Mr. Wagonseller was compelled to gain experience for himself, and planted and tested a great number of varieties, many of which were not successful. He planted plums and pears largely, and for a number of years made the drying of plums for the city market successful, and was even able to ship pears profitably, with the haul to Cloverdale by wagon. These experiments did much to show the adaptability of this section for plums and pears, and to indicate the direction which the industry would take. In 1873 and 1876 others began to plant prunes largely, R. McGarvey and D. P. Cowsert, at Ukiah, and the Clay Ranch, at Sanel, being among the first good-sized prune orchards planted.

"It is now conceded that this section produces prunes of exceptional size and quality, and that being less juicy they are more profitable to the buyer—at least 16 per cent. Prunes are being planted constantly, and now a fresh impetus is given to the business. The large hop kilns can be used as driers, saving the erection of others. There are now in Ukiah Valley about 200 acres of prunes; in Sanel, about 75 acres; in Potter, 40 acres, and probably 25 acres in Redwood Valley. The Bartlett pear is another fruit to which attention is being drawn, and about 125 acres are to be found in the three valleys. Plums do wonderfully well, but the dried fruit sells poorly. Apples of very good quality are produced, the yield being very heavy.

"The Thomas Bros., in Redwood, have made a great success in raising peaches for the home market, and many are grown all through the section, although not as a market fruit. Nectarines grow well, but apricots are a failure. Figs do well in some places, while on all of the upper slopes grapes do as well as could be asked. Messrs. Myers at Hopland, Gobbi at Ukiah, and Peters, Seward, and Morrow at Calpella, have fine vineyards, and are said by good judges to produce fine wine.

"Sanel Valley has great advantages for fruit growing, and is building up fast. Conditions in Ukiah are much the same. The land in Redwood Valley is not so rich, and held at much lower rates, and many new settlers have bought small tracts for fruit growing. In Potter Valley interest is awakening, and many prunes are being planted.

"In speaking of fruit growing in the section along the coast, I feel some diffidence, for I have not the information, either as to acreage or the industry itself, to write it up as thoroughly as I would wish, or to do justice to the section. All along the coast from Gualala to Bear Harbor orchards are to be seen, varying from a few dozen trees to 5 acres. In this statement I do not include those orchards lying back a few miles, for climatic conditions are altogether different, and I have already spoken of them under another head. For successful fruit growing on the immediate coast some shelter is necessary from the winds, and orchards are either planted in protected situations, or wind-breaks are used.

With such protection as this, excellent apples and pears are grown, as well as some plums and cherries, while if we think of small fruits—strawberries, blackberries, raspberries, currants, and gooseberries—they grow so readily and bear so well as to be hardly an object. All varieties of apples ripen much later than in the interior valleys, are more acid and crisp, and of finer flavor. Pears are also very good. Few orchards are planted as a business proposition, but few of the farms are without some trees, and more are being planted every year. A few miles back, either on the ridges or sheltered clearings, there is reason to suppose that fruit could be raised very profitably.

"There is a belt of country running through Mendocino County from north to south, including Yorkville, Anderson, Christine, Comptche, and other small valleys, lying within the limits of the redwood forest; the climate is much tempered summer and winter by the influence of the fogs from the ocean, from which they are distant by air line only 6 to 15 miles. This belt of country does not contain a very large quantity of tillable land, Anderson Valley being the most extensive, and it may be said of it that wherever a fruit tree can be planted it will thrive.

"All of the deciduous fruits, excepting apricots, do exceedingly well, but the one thing in which this region excels is the apple. Not only are the apples of this section beautiful in appearance and large in size, but they possess as fine a flavor as any that grow in North America. This is due to the cooling influence of the fog, which in most of these places keeps the summer temperature well down. The trees are exceptionally thrifty and bear very heavily. I have seen orchards bearing fine fruit without the least cultivation, and even single neglected trees in fence corners or pastures that were doing well. The early settlers planted many trees, perhaps as much from force of habit as otherwise, for in those days the market was distant and transportation difficult.

"The coast section has furnished a market for a great deal of fruit. Some has been brought to Ukiah and Cloverdale, and even been shipped to the city, where the fine quality causes a remunerative price to be received. The section around Comptche, where Mr. Hoak and others have fine orchards, finds a ready market for its fruit at Mendocino City, the distance being about 17 miles. There is also some fruit shipped through the latter port to San Francisco. Up the country are several fine orchards at different points, from 5 to 15 miles from the coast, and these orchards have a good outlet for their products over the wagon roads of that section. It may be said, however, that if dependence is placed on the local markets only, the limit of the development of the fruit industry has been reached. Its further extension would depend on one of two things: first, cheap transportation; second, drying the fruit.

"With cheap transportation these fine apples will find a good market anywhere in California, and at paying prices. Anderson Valley, in which I would include all of that section from Yorkville to Christine, may have cheap transportation in the near future. An extension of the road up the Navarro River only a few miles would bring it to the lower end of Anderson Valley, and give a cheap route by water to the city. Hopes are also entertained of a railroad to Russian River Valley, crossing the low divide, to the headwaters of the Navarro. Such a road will doubtless be built, but the scheme is altogether too indefinite as to time to justify one in basing a business proposition upon it. The people of

Anderson Valley are acting more wisely, for by the erection of numerous driers they have solved the problem of marketing their fruit. Lumber, fine redwood too, is to be had at $8 to $10 at the mills, which are in the very edge of the valley. Labor is reasonable. These facts permit the erection of a drier at the cost of $100 to $500, which will handle the fruit of a small orchard to perfection. Every orchardist can have his own drier. Wood is very cheap; to be had for the cutting. These driers easily handle the product of 5 to 15 acres of old orchard. Fruit is bought of neighbors and dried, and it can be said truly that none goes to waste. The finest drier is that of J. D. Ball, near Boonville, with a capacity of several tons of green fruit per day. The evaporated apples are readily bringing 8 cents per pound in this season of depressed prices.

"Land fit for apples is held at very reasonable rates, and at current prices the residents can well afford to plant. A great impetus has been given to the fruit growing of the section, and much is being put out. I have spoken of apples, not because the climate of this section is only adapted to this fruit, but because they have so many advantages that good sense would dictate paying special attention to their culture. Prunes do well here, and orchards of from 5 to 20 acres are being put out every season. Prunes will rank second in the fruit development of this section. Peaches, pears, and plums do splendidly. Grapes only thrive in warm situations.

"In leaving this section we would say that its future in fruit growing is very bright, and with quick and cheap transportation it will surely boom.

"All along the road from Ukiah to Mendocino City, on that long ridge, small orchards are being planted. The rugged nature of the country makes large plantations impossible, but for these small growers we can offer only encouragement, for the beautiful fruit they produce will always find a paying market, even if it has to be hauled 15 or 20 miles, and this isolation is a protection from insect foes."

The principal fruit sections of Mendocino County are Ukiah, Potter, Little Lake, and Anderson Valleys. In these, pears and prunes are the favorite fruit in Ukiah; apples, pears, and prunes in Potter Valley; apples and prunes in Little Lake and Anderson. Probably the oldest orchard is that owned by John Mewhinney and planted by his father, Samuel Mewhinney, in 1859. This is principally of apples, the stock having been procured in Sonoma County.

The principal markets for Mendocino fruit are local and San Francisco, the greater part of that shipped being packed in boxes and forwarded to the San Francisco market.

The exports of different sections for 1891, as reported, were:

	Tons.		Tons.
Anderson	500	Comptche	60
Little Lake	100	Caspar	7
Pomo	4	Christine	250
Ukiah	55		
Whitesboro	48	Total	1,024

Reports of the condition of the present season's crop from most districts of this county are generally light. Apples from one half to two thirds of the crop; pears, three fourths; peaches and plums, about one half of the usual average.

ACREAGE AND VARIETY OF FRUITS IN MENDOCINO COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	536	60	596	10
Apricot		3	3	
Cherry	10	7	17	1
Fig		1	1	
Olive	2		2	
Peach	47	50	97	12
Nectarine	15	25	40	6
Prune	121	447	568	127
Pear	80	30	110	12
Plum	25	10	35	3
Orange		1	1	
Nuts—Almond	3	2	5	1
Raisins	7		7	
Table grapes	14		14	
Small fruits	9	4	13	3
Totals	869	640	1,509	175

The planting for the present season has been light, over 90 per cent of the total acreage being in old orchards.

Irrigation is resorted to to a very limited extent, a few private ditches being taken from the natural watercourses. There are no irrigation companies or districts.

MERCED COUNTY.

Merced County is in the heart of the great San Joaquin Valley, and is centrally located in the State, being almost equi-distant between the northern and southern boundary lines. It is bounded on the north by Stanislaus, on the west by Santa Clara and San Benito, and on the south by Fresno County. The greater part of its extent, which is about 90 miles east and west and 40 miles north and south, comprising an area of 1,968 square miles, or 1,115,336 acres, lies directly in the San Joaquin, across which it extends from the foothills of the Sierra Nevada range on the east to the summit of the Coast Range on the west. In the northeastern portion of the county there are high foothills, increasing in height as they approach the higher lands of Mariposa County, where they merge into the high Sierra. On the southwest is the Coast Range, with rugged steppes, abrupt cañons, fertile valleys, and hills sloping to the plain, in the lower part of which lies the San Joaquin River.

With the exception of this small portion of the eastern part of the county, and that situated on the eastern slope of the Coast Range, the county is almost a level plain, broken only by watercourses.

The San Joaquin River passes in a northerly and southerly direction almost through the heart of the county. There are no precipitous banks to the river in this county, and during the high waters it frequently overflows its banks, inundating the adjoining country for a distance of some 3 miles on either side, twice each year. To the west of the San Joaquin River are the rolling, picturesque foothills of the Coast Range.

A large number of creeks take their rise in the mountain ranges on either side of the valley. Most of these are torrents in the winter, only to become dry beds in the summer. Some find their way into the plains, and, where not diverted for irrigating purposes, become lost in the sand. Among the principal streams on the east side are the Chowchilla River, Bear, Black Rascal, Dry, Mariposa, Dead Man, Mills, Owens, and Dutchman Creeks; on the west side are San Luis, Quinto, Los Baños, Cottonwood, Sycamore, and Wild Cat Creeks. The principal stream, however, is the Merced River, which, having its source in Mariposa County, in the Yosemite Valley, runs the greater part of its course through Merced, flowing through the entire length of the county, and reaching the San Joaquin on its western border.

On the eastern side of the San Joaquin are the bottom lands and plain lands, skirted on the east by a narrow strip of low foothills, adapted to some classes of horticultural industry. The Merced River bottom has an average width of 3 miles, with an abrupt bluff on each side, and the soil here is found exceedingly fertile.

The climate of Merced differs little from its sister counties of the San Joaquin Valley. The summer months are hot, not usually oppressively so, although occasional days in the heated term are too hot for absolute comfort, although not too hot for fruit drying, at which season they usually come. Frost is infrequent. The mercury will, in the winter, sometimes drop as low as 25° in some portions, but so low a temperature is the exception. This extreme low temperature may be expected in January, but never in any other month. The extreme heat in the summer occurs in July and August, when, for a few days in succession, the mercury may rise to 108° in the shade in the middle of the day. On account of the very great dryness of the atmosphere, the most extreme heat in the summer does not interfere with any farm or outdoor work. The rainy season commences anywhere from October to December, and usually when not raining the weather is clear. Snow sometimes falls in the higher foothills, but not frequently. Fogs are not common, and occur mostly in November and December.

The following table gives the rainfall at Merced City for the ten years from 1877 to 1887:

	Inches.		Inches.
1877-78	13.77	1882-83	10.40
1878-79	6.82	1883-84	23.13
1879-80	12.80	1884-85	8.40
1880-81	11.87	1885-86	18.34
1881-82	9.73	1886-87	6.74
Average rainfall for ten years			12.20

The rainfall for the past four years is given by months, as follows:

	1888-89.	1889-90.	1890-91.	1891-92.
September	.60	.00	1.99	.00
October	.00	2.30	.00	.00
November	3.13	4.45	.17	.21
December	2.38	6.03	2.02	4.07
January	.50	4.87	.51	.34
February	.33	1.62	2.84	1.06
March	2.30	1.16	1.54	2.33
April	.26	.49	1.34	1.06
May	1.00	.78	.00	2.44
Totals	10.50	21.70	10.41	11.50

The soil of Merced varies with the locality. There are the alluvial lands of the bottom, a heavy reddish adobe loam, mixed with gravel, a lighter chocolate-colored loam, containing much gravel and sand, and a very sandy loam. The alluvial bottom land soil occurs over a large body of land in the southern as well as in the western part of the district. It is a comparatively late deposit from the Merced River, Bear Creek, and other smaller streams, dark gray in appearance, easy to work, and does not bake after irrigation; it is *the* soil for gardens and grapevines. This alluvial soil is also easily irrigated, and holds the water well, and everything planted in it grows quickly.

The heavy adobe-like loam is a direct wash from the foothills, and is principally found at their base. The color of this soil is dark brown, like chocolate, and it turns darker yet when irrigated. It contains a great deal of iron, and is rich in all constituents which promote plant life. When properly moist, and not too wet, it plows and cultivates well and readily, and pulverizes to a beautiful loam. This soil is the favorite soil for the orange, not only because it is a rich soil and contains much gravel, but principally on account of its location along the base of the hills, the very place where the thermal belt reigns supreme. This soil is also eminently suited for olives, and must as such be considered as the olive soil. Old olive trees grown in this soil are yearly loaded with fruit.

The third variety of soil is the very dark, blackish-red chocolate loam, very similar to the best of other soils of this character. It differs from this, however, in being more reddish, and it contains much iron. Like the adobe soils, it hardens if left alone after irrigation, but pulverizes readily if plowed or cultivated in time. As to location, this soil is also found at the base of the hills. Geologically considered, it is of older formation than the alluvial soils; in quality it is equal to the best soils anywhere.

A fourth variety is a light, sandy loam, easily worked and irrigated, which holds moisture well, and which abounds in soluble plant-food ready for the immediate use of the trees.

Like most of the land in the San Joaquin Valley, irrigation is an absolute necessity over the larger portion of Merced County in the production of fruits and summer crops, and the county possesses one of the greatest irrigation works in the State in the Crocker-Huffman Canal. This was owned by the Merced Canal and Irrigation Company, the principal stockholders in which were C. H. Huffman, of Merced, and Charles Crocker, of San Francisco. The capital stock of the company was $2,000,000. Operations were conducted by the company until April, 1888, when it was reincorporated under the name of the Crocker-Huffman Land and Water Company, with a capital stock of $3,000,000. Mr. Huffman has had actual charge of the work of construction, and the work is considered one of the finest on the Pacific Coast. The design was to run the canal from the point of inlet, near Merced Falls, across the country to Plainsburg, some 10 miles southeast of Merced City, on the Southern Pacific Railroad. And it was so surveyed as to maintain as high an elevation along the edge of the foothills as possible, thereby securing a supply to as large an area of land as was compatible with the necessary fall required to maintain the current. The entire length of the canal so planned, from the point of diversion to the Chowchilla River, is now 50 miles. This, however, does not properly represent the work done, as there are some 150 miles of lateral or subsidiary canals now built as part of this system, and these are constantly being added to as demand requires. The main canal was made 60 to 75 feet wide at the bottom, 100 feet wide on top, and 10 feet deep, the carrying capacity being thus about 4,000 cubic feet per second.

In the engineering part of the work, among the vast difficulties encountered during its progress not the least was the cutting through of two tunnels, one of which, with its approaches, was 5,000 feet in length, and the other 3,500 feet. These are 22 feet wide and 12 feet high, with a fall of 14 feet to the mile. One was blasted through solid rock, mostly, while the other presented equal difficulties, by reason of its soft formation, and necessitated the use of some million and a quarter feet of supporting timbers. Blasting had also to be largely resorted to in the cutting of a large portion of the way through cement gravel, which is as difficult of removal as rock, and which was met with to a great extent on the line of the canal. Lake Yosemite, into which the water from the canal empties, is an artificial reservoir, from which water is taken to supply the city of Merced, as well as for irrigation, the water being conveyed to the city in iron pipes.

To carry out this stupendous project was a heavy contract to undertake, and many predictions of ultimate failure were periodically made, but nevertheless it was pushed boldly to completion. A dam 4,000 feet in length was constructed of cement, gravel, and earth, and of sufficient thickness to give perfect security against breakage, being 275 feet wide at the base, 20 feet wide on top, and 60 feet high, and along the crest runs a smooth road, from which a splendid view of the lake and its immediate surroundings is obtained.

This name was given to Lake Yosemite because its waters, coming through the canal, originally emanated from the Yosemite Valley by the way of the Merced River. The superficial area of the lake is upwards of a square mile, and the average depth is 30 feet. This reservoir was constructed at a cost of $200,000, and as much more was expended in continuing the work for the water-supply system of and to Merced City, including some 3,000 tons of cast-iron pipes, hydrants, laying pipes, etc. The main pipe leading the water from the reservoir to the city is 16 inches in diameter, while the distributing pipes vary from 6 to 8 inches. The reservoir has an elevation of 90 feet above the level of the railroad track at Merced, and, as double hydrants are used in the city, a fire can be quenched in any building in the city by direct pressure, without the use of steam engines. The formal opening of the canal was made the occasion, during 1888, of a grand demonstration, and the ceremony of turning in the water to the lake was participated in by some five or six thousand people, including many from abroad. The Governor of the State and many officials, representatives of the railroad company, were among those who graced the event by their presence. The people generally were full of rejoicing at the exercises. The two men whose enterprise and capital had made success possible were present to witness the happy result of their labors, and Charles Crocker turned on the water for the first time into the reservoir.

The entire cost of the canal and waterworks plant was $2,000,000, and that much more was expended in the purchase of land contiguous to the line of the system. The company owned all of the equipment made necessary for construction of the plant, and had about 500 mules at work. The force of men employed at one time was 700, while the number was always large. Owing to the personal attention given to the details of the work by the President, good work was the rule and result at every point. Besides supplying an abundance of water for city purposes, the canal furnishes sufficient to irrigate over 600,000 acres of land. A large part of the land, though almost worthless without water, becomes very valuable with it. The principal object of the company now is the development of its own lands and those owned by others which come under its system, and to induce settlers to locate upon it. The canal portends a great future for this county. Already the effects are visible in a degree in the splendid results of such progress as has been made, but the beginning of an era of prosperity, which is certain to follow, is only in its infancy.

The enterprise which made the canal a success has been rewarded and will be more fully compensated hereafter, but the benefit derived by the promoters is insignificant compared to the good which will ultimately result to this county by reason of it. The Directors of the Crocker-Huffman Land and Water Company are: C. H. Huffman, President; Col. C. F. Crocker, Vice-President; W. H. Crocker, M. S. Huffman, and W. R. Huffman.

Besides the Crocker-Huffman Canal there are two other large irrigation systems in operation in Merced County, namely: the San Joaquin and Kings River Canal, and the Stevenson & Mitchell Canal. The Turlock Irrigation District will also extend its irrigation system over the northwestern boundary of the county.

The Stevenson & Mitchell Canal Company take their water from the San Joaquin River, in Sec. 6, T. 9 S., R. 12 E., M. D. M. No dam is necessary, because the level of the river during a great portion of the year is higher than the level of the surrounding country. The canal runs in a northwesterly direction for about 20 miles, irrigating about 50,000 acres of land. The canal, where it leaves the river, diverts about 500 cubic feet of water per second.

The San Joaquin and Kings River Canal system, which irrigates upward of 30,000 acres in Merced and adjoining counties, has been in operation since 1872, it being incorporated under the name of the San Joaquin and Kings River Canal in September, 1871. It takes its water from the San Joaquin, near the mouth of Fresno Slough, in Fresno County. Probably about twenty sections have been irrigated by this system in Merced County during the last season.

It is proposed to extend lateral canals from the canal of the Turlock Irrigation District throughout a portion of the territory lying between the Merced River and the boundary line between Merced and Stanislaus Counties. The area irrigated by this means will extend in an easterly direction nearly to Dehli Station, on the Central Pacific Railroad, and westerly almost to the San Joaquin River. The Turlock Irrigation District, organized under the Wright law, lies in both Stanislaus and Merced Counties, the largest area being in the former county.

In the southern portion of the county artesian water is obtained, some at very shallow depths. The artesian area within which flowing wells have been obtained extends throughout the county from a southeasterly to a northwesterly direction upon either side of the San Joaquin River. This area may, roughly speaking, be said to be bounded upon the northeast by the main line of the Central Pacific Railroad, and upon the southeast by a line about one mile northeast of the San Joaquin and Kings River Canal.

The strata from which flowing water is obtained are found beneath a stratum of blue clay, which is struck at a depth of from 100 to 200 feet upon the eastern side of the area described, and from 200 to 300 feet upon the western side. Upon the western side of the valley this stratum of blue clay does not appear to rise; indeed, as has been already observed, it lies much deeper than upon the eastern side of the San Joaquin River.

The shallowest flowing wells are upon the eastern edge of the artesian area, but they yield the least amount of water; as the center of the valley is approached a greater depth has to be attained, but the flows are stronger.

The strong flow of artesian water continues upon the west side of the San Joaquin River to within two miles of its western limit; at that point the hydrostatic pressure which afforded strong flowing wells nearer to the San Joaquin, owing to the rise in the surface of the ground, is only able to yield a weaker flow. The identity of the water-bearing strata is evidenced by the fact that when receding westward from the point of strongest flow, the relative strength of the flow from borings of similar depth is inversely proportional to the superficial elevation. Toward the eastern limit of this artesian area, flowing water can be obtained at a depth of 128 feet, but in no great volume, the water only just flowing over the edge of the casing at the surface of the ground.

IRRIGATION WORKS IN MERCED COUNTY.

Name.	Miles.	Assessed Value.
San Joaquin and Kings River Canal and Irrigation Company	38	$76,000
Crocker-Huffman—main canal	20⅞	52,187
Crocker-Huffman—branches	12⅜	14,850
East Side Canal Company	17½	8,750
Totals	88¾	$151,787

With the soil, water, and climate so nicely adjusted by nature to the wants of the fruit grower, the only wonder is that more progress has not been made in the culture of fruits. However, much has been done in various sections to fully demonstrate the assertion that fruit culture in Merced County is a success, as is evidenced by the large acreage on the Merced River. The Rotterdam Colony has some 1,500 acres growing fruit trees; the Hooper Colony has some hundreds more; the Buhach, the Dean, and numerous other colonies have hundreds of acres successfully planted to various deciduous fruits.

The cereal and large wheat era in the history of Merced is now giving way to horticulture. The vast Crocker-Huffman property about Merced City, covering many thousands of acres of exceedingly fertile land, is being settled by small farmers, and a splendid beginning has been made toward the development of the horticultural capabilities of this section. An admirable illustration of what can be accomplished by perseverance on these vast plains is seen on the famous Buhach Ranch, near Atwater, a few miles north of Merced. This ranch was, but a few years since, a piece of grain and pasture land, worth but a few dollars an acre. Water was brought to it, however, and a commencement made. A large area of wine, table, and raisin grapes was planted, together with apricots, peaches, almonds, pears, and other fruits. Peaches and apricots thrive in the various colonies about Merced. It may truthfully be said that for deciduous fruits these lands are quite equal to any in the State, producing fruit that is second to none grown elsewhere.

Prunes and plums thrive equally well on some of the lands, there being no fruit more profitable or desirable to the horticulturist, as California is the only place in the United States where prunes can be successfully and profitably grown where the fruit can be dried in the sun, thereby giving to us, as it were, a monopoly on this branch of horticulture.

Pears thrive unusually well on the moist, heavy lands, and prove to be a very profitable crop. The pears grown here have a very fine flavor, and for beauty cannot be surpassed, paying handsome returns to the growers of this luscious fruit, which is produced to perfection on the soils above mentioned.

The raising of olives is one of the most promising industries here. Of all trees thus far planted, and there are many out, only good results are heard. In one plantation on the Rotterdam Colony alone, there are about 160 acres planted that are doing magnificently. Gustav Eisen, in speaking of the olive in Merced, says: "Our soil, climate, and other conditions are exceedingly favorable to the culture of the olive, the most noble of all fruits known to man."

The orange will thrive best in the thermal belt of the Sierra Nevada foothills, and the nearer to the mountains the better the locality is adapted to citrus culture. This is accounted for by climatic influences, the soil being the same as in the valley proper. Nevertheless, the orange grows in and about Merced City. Some eight years ago, Mr. Atwater planted eighteen orange trees, and the vigor with which they grew, and the prolificness with which they fruited, led him to extend his cultivation of these fruits. Three years ago he set out 11 acres, just to the north of his residence, to orange and lemon trees, and skirted the outside of the citrus fruit with olives. The orange trees are of four varieties, budded stock, as follows: Parson Brown, Jaffa, Mediterranean Sweet, and Washington Navel. The lemons, of which he has two hundred and fifty trees, are of the Villa Franca variety. His olive trees number about three hundred and fifty, and are of the Mission variety.

The principal fruit sections of Merced County are Merced, Snelling, Merced Falls, Atwater, and Turlock.

Merced's principal industry in the past has been the growing of cereals, and it is only within the past few years, and especially since the completion of the Crocker-Huffman Canal, that any attention has been paid to fruit growing on a commercial scale. Of late years, however, a number of important colonies have been located in this county. Several of these, composed of Hollanders, are in existence here, and are in a very prosperous condition.

Fruit of various kinds thrives well, the favorite varieties being apples, apricots, peaches, plums, grapes, and berries. No large amount has as yet found its way to market, as the orchards are usually young and the trees have not come into full bearing. That which is shipped out of the county, however, finds a ready market in Stockton, Sacramento, and San Francisco.

Acreage and Variety of Fruits in Merced County.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	30	4	34	2
Apricot	23	12	35	3
Cherry	2	2	4	1
Fig	39	130	169	46
Olive	3	297	300	70
Peach	164	259	423	89
Prune	13	135	148	57
Pear	31	56	87	20
Lemon	1	4	5	2
Orange	6	46	52	12
Nuts—Almond	8	57	65	23
Walnut	7	7	14	1
Chestnut	4		4	
Raisins	1,160		1,160	
Table grapes	465		465	
Totals	1,956	1,009	2,965	326

MODOC COUNTY.

Modoc County lies in the extreme northeastern part of the State, and is bounded on the east by the State of Nevada, on the north by Oregon, on the south by Lassen, and on the west by Siskiyou County, and has an area of 4,296 square miles, or 2,700,000 acres. The topography of this county is a succession of mountain ranges and valleys, and is principally drained by Pitt River, which has its outlet in the bay of San Francisco. The lava-bed section, at the northeastern corner of the county, is a succession of gulches and crevasses, which range from a few feet to 100 feet in width, and many of them are 100 feet deep; some have subterranean passages which lead for miles under the rocks. This broken country extends in a belt eastward to Goose Lake. This lava section of the county has no arable lands, and it is fit only for grazing purposes. It is a vast plain of table-land, and in some places it is sparsely covered with juniper.

The valleys referred to as forming part of its topography are a very important feature. Surprise Valley lies in the extreme east, lengthwise north and south, and includes in its eastern portion three lakes, varying in length from 15 to 20 miles, and from 3 to 5 miles in width. These lakes have no outlet. The valley is about 60 miles long and 15 miles wide, and is skirted on two sides by lofty, timbered mountains. It is watered by numerous streams. Goose Lake Valley lies mostly on the eastern side of Modoc Lake (which is 30 miles long and 15 miles wide, extending into Oregon on the north), and is watered by numerous small streams. On the west side of the lake there is a narrow strip of valley. Big, or Round Valley, on Pitt River, in the southwestern portion, and reaching into Lassen County, is 30 miles long and 18 miles wide.

The soil of Surprise Valley is a rich, black loam. This valley is partly under cultivation, wheat, barley, hay, fruit, and vegetables being the staples. Dairying is also carried on to a considerable extent. Goose

Lake Valley is covered with bunch and other grasses, and boasts of some good, improved farms. The soil of Big, or Round Valley, is varied in character, from red to dark loam. Within the valley are several creeks, the rich bottom lands of which are, to some extent, under cultivation. Stock raising is the principal industry. There are many places in the mountains now used for grazing, which are well watered by springs and small streams, and, having a deep, rich soil, are suitable for general farming purposes.

On the foothills is found what is known as "bunch-grass land," a sedimentary deposit easily worked and very fertile.

The climate is that of the temperate zone, but the winters are much milder than in the Eastern States. Snow falls in the valleys and on the mountains, but does not lie long in the valleys. Stock will live through the winter without feeding, but it is always profitable to feed stock during the winter months. Occasionally the mercury will reach zero in the winter, and sometimes touch 100° in the summer, but these are extremes. The average monthly rainfall, as recorded at Fort Babbitt and Fort Bidwell, is given below:

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Fort Babbitt	1.63	.68	2.24	.31	.20	.18	.08	.10	.21	.25	2.75	3.17
Fort Bidwell	4.15	2.71	2.19	1.57	1.33	1.00	.27	.21	.38	1.04	1.99	3.22

The county is well watered, and but little irrigation is done. Pitt River, which has its source in this county, aided by numerous smaller streams, furnishes water for all purposes, while springs are numerous over the greater part of the county. In the valleys excellent water can be procured by boring to a depth of from 6 to 30 feet.

Horticulture has but a small place in Modoc County as yet, the principal industry so far being stock raising. While, however, a comparatively large area of the county is worthless for agricultural purposes, there is a great deal of territory which, under proper cultivation, might be made profitable in fruit. The greatest drawback to this industry is the remoteness of Modoc from markets and its lack of railroad facilities. As it is there are a number of orchards of various kinds of fruit. Surprise Valley, 25 miles northeast of Alturas, has several excellent orchards, and large quantities of very fine apples are grown here; peaches, pears, and cherries do well, and in the vicinity of Goose Lake an abundance of wild plums is found. Strawberries and other berries thrive here, and if transportation facilities are ever afforded it, Modoc will take her place among the other fruit counties of California.

The soil of Modoc County is largely a sandy loam with occasional patches of adobe, very largely intermixed with volcanic tufa and lava. The whole country is of volcanic origin, and in most parts very forbidding and unfit for agriculture. There are, however, a great many fertile valleys scattered through the county, at present used for stock and grazing purposes.

The fruit industry has as yet made no great headway, the orchards being small family patches. Where trees have been planted and properly cared for, they have done well and the yield of fruit is generally large. The quality, especially of apples and the more hardy varieties, suited to this climate, is very excellent. The principal sections where fruit is grown are Goose Lake, Surprise Valley, Hot Springs Valley, and Big Valley, and the area in these will amount to about 280 acres, distributed as follows:

	Acres.
Goose Lake	100
Surprise Valley	100
Hot Springs Valley	20
Big Valley	10
Scattering	50
Total	280

The principal varieties of fruit grown here are apples, pears, plums, cherries, and berries. In some places peaches do well, but are not recommended for this locality. There has been no new land set to orchards in Modoc County, and those found here are generally old and in full bearing. The greater part of those now in existence were planted between 1864 and 1870. George Wimer, of Surprise Valley, Mrs. Godfrey, of Cedarville, and Mr. McDaniels, of Lake City, have the oldest orchards in the county. The stock was procured from Reno in Nevada.

Irrigation is resorted to on a small scale, the ranchers owning their own ditches. There are no large irrigating companies in this county. In July of the present year, some farmers organized an irrigating company on what is known as the "West Side." This company was incorporated under the name of "Bull Run Irrigation Company," with R. A. Ricketts as President and R. E. Paulk as Secretary. This is the first irrigation company organized in Big Valley, and probably will be the means of further irrigation development in this section.

Big Valley is a very large and fertile body of land, capable of yielding large returns in cereals and fruits, if properly cultivated, with the aid of irrigation. It is at present used almost wholly for stock grazing. There are numerous streams in this county from which water can be diverted. Among them are the Pitt River, and Bidwell, Soldier, Cedar, Mills, Eagle, Owl, Cottonwood, Goose, Emerson, Silver, New Pine, Cottonwood No. 2, Willow, Lassen, Davis, Franklin, Joseph, and Tom's Creeks. These are merely small streams fed from the snows of winter. The snowfall will average about 15 inches in the valley, and from 10 to 15 feet on the mountains.

The nearest railroad point to Alturas, the county seat of Modoc County, is Amedee, which is 135 miles distant. The road is very rough and rocky over a large part of it, which makes the transportation of fruit from Modoc County to railroad points almost impracticable. Therefore, very little has been shipped outside of the county.

Last year H. L. Spargur, of Surprise Valley, shipped about 1,000 pounds of apples, which found their way to the San Francisco market, and this formed the bulk of fruit exported from the county.

The yield last year was very large, but Modoc, in common with the rest of California, was visited by a late frost last spring while the trees were in bloom, and, as a result, the apple crop this season will not exceed half the usual amount. Other fruits will also fall short, but they were not so severely injured as were the apples.

The output of various fruits in this county in 1891, from estimates furnished by Mr. Emery Null, was as follows:

	Tons.		Tons.
Apples	10	Prunes	5
Pears	3	Quinces	1½
Peaches	8		
Apricots	2½	Total	33
Plums	3		

Acreage and Variety of Fruits in Modoc County.

	Acres in Trees.		Acres in Trees.
Apple	210	Pear	25
Apricot	6	Plum	10
Cherry	3	Quince	2
Peach	14		
Prune	10	Total	280

MONO COUNTY.

Mono County is a long, narrow county, its greatest length bordering on the State of Nevada, which forms its northeastern boundary. On the south it is bounded by Inyo, and on the west by Fresno, Mariposa, and Tuolumne, and on the northwest by Alpine County. It has an area of 2,796 square miles, or 1,790,000 acres, of which all but 400 square miles are mountains.

The western portion of the county lies among the Sierra Nevada Mountains, the heights being clad in snow, and the slopes of the range being covered with forest trees. Among the highest peaks in the county are Mount Dana, 13,627 feet high; Mount Lyell, 13,217 feet high, and Castle Peak, 13,000 feet high. The eastern portion of the county, which is usually spoken of as a strange, mysterious country, is of a desert-like, volcanic character, abounding in salt pools, alkali, and volcanic table-lands, the characteristics of this portion of the county being significantly indicated by some of the local names, such as Hot Springs, Geysers, Sulphur Springs, Black Lake, Soda Pond, Volcanoes, Obsidian Mountain, Deep Cañon, Volcanic Table-Land, Red Crater, Adobe Meadow, and Oasis. Mono Lake, situated in the center of the county, is about 15 miles long by 10 miles wide, its waters being a somewhat unusual compound, various chemical substances being found in solution in them. This lake has the appearance of having once been the scene of volcanic action; the country surrounding it, as Bodie, Aurora, and Benton, abounding in minerals. A number of volcanic cones, having extinct craters, lie to the south of the lake, and a great portion of the formation of the district may be considered volcanic; debris consisting of porphyry, granite, limestone, and a remarkably pure obsidian, and deposits of lava are found at Aurora and Table Mountain. The fires of the ancient volcanoes may not yet be all extinct, for upon the islands in the center of the lake jets of hot vapor escape, and there are a number of boiling springs of water. The great bluffs and rocky ravines of the Sierra come almost to the western shore of the lake, while upon the western side salt deposits and lines of driftwood mark the plain, showing very distinctly what were the former more extensive shores of this sheet of water. Upon the bluffs of the western side are water marks, which make it seem highly probable that the waters were once almost a thousand feet above their present elevation, spreading out over the plains to the east to form a great inland sea. The lake receives a number of small streams, but is without a perceptible outlet. Owens River in the south, which takes its rise in a high peak in the Sierra, Mount Kitten, and Walkers River in the north, being the principal streams in the county, the one passing through the southern part of the county into Inyo, the other continuing its course, after rising in Mono, to the State of Nevada.

Mono County being situated on the eastern slope of the Sierra, and the larger portion of it in the high mountain regions, has a climate totally different from that of the western slope, and resembles more that of the Eastern States than that of California. In the higher altitudes the summer days are pleasant, although in the lower valleys the mercury will rise well toward 100° occasionally. The winters are characterized by heavy snowfalls and severe frosts.

The valley soil of Mono is formed by erosion from the mountains, and is to a great extent sedimentary, with alluvium. A great deal is barren and sandy, and great tracts of alkali are found. There is, however, a considerable amount of fertile land, which, by the aid of irrigation, can be made productive, and already much has been brought under cultivation by this means. Cereals do not attain that perfection of growth so desirable, partly from the extreme altitude of the county, and partly from the rigors of the climate, attendant to some extent thereupon.

Mono County has, however, a considerable cultivable area; much of it is very rich and fertile. This lies mostly in the western part of the county. Among the richest of her agricultural lands may be classed Bridgeport Valley, or Bridgeport Meadows, as it is frequently called; Antelope Valley, Long Valley, and the famous Adobe Meadows in the vicinity of Mono Lake. There is also a large amount of rolling foothill country admirably adapted to grazing.

The altitude and physical characteristics of the county do not favor horticulture, and but little fruit is grown. However, there are a few favored localities where fruit trees under proper care do well. Of the different kinds of fruit grown in this county, J. H. Connell, of Coleville, reports the varieties as follows:

Apple: Early Harvest, Red Astrachan, Red June, Alexander, White Winter Pearmain, Fall Pippin, Yellow Bellflower, Spitzenberg.

Peach: Governor Garland, Briggs' Red May, Hale's Early, Early Crawford, Late Crawford, Susquehanna, Stump the World, Foster, Morris White, Salway, Lemon Cling, Twenty-ounce Cling.

Pear: Bartlett, Winter Nelis, Madeline.

Cherry: Royal Ann.

Plum: Bradshaw, Green Gage, Washington, Columbia, Damson, Peach, Cherry.

Quince: Portugal, Orange.

Currant: Cherry.

Strawberry: Captain Jack, Sharpless, Monarch of the West, Park Beauty, James Vick.

As stated above, Mono cannot be classed as a fruit-growing county. It is situated high in the Sierra Nevada range, and its altitude, topography, and climate, except in a few favored localities, preclude the successful cultivation of orchard trees.

Mining is here the principal industry, lumbering following in order, fruit growing holding a very inferior position.

Very little is done in the line of irrigation, and there are no irrigation works in existence in the county. There is one mining ditch reported, that of the Mono Virginia Creek Hydraulic Mining Company, having a length of 5 miles, and an assessed value of $16,000.

The bulk of the fruit raised in the county is grown in the immediate vicinity of Mono Lake, and the principal fruit is berries. The soil, generally, is very rocky, and there is not an orchard in the county of over 5 acres in extent.

The following are the principal orchards in the county and are located at Coleville, and for the present comprise about the extent of the industry:

J. F. Owens	5 acres.
John H. Connell	2 acres.
William Radler	2 acres.
J. L. C. Sherwin (Bishop Creek)	2 acres.

MONTEREY COUNTY.

Monterey County is bounded on the north by Santa Cruz County and Monterey Bay, on the east by the counties of San Benito, Fresno, and Tulare, on the south by San Luis Obispo County, and on the west by the Pacific Ocean. It covers an area of 3,328 square miles, or 2,300,000 acres. Monterey County is about 100 miles south of San Francisco, between parallels 35° 45′ and 37° north latitude, and is 80 miles in length by 45 miles in width. Owing to the peculiar topographical character of the county, with its rough mountains and broad plains, gently rounded hills and fruitful valleys, it has a great diversity of soil, climate, and productions, making it, for purposes of settlement, one of the most desirable regions in the State. The county is divided into three sections—the mountains and hills on the east, the mountains and hills on the west, and the great Salinas Valley, situated between the ranges of mountains, and opening upon Monterey Bay at the north. The Salinas Valley extends south from Monterey Bay over 100 miles, and is from 5 to 15 miles wide.

The Gabilan range has a length of 75 miles and a breadth of 20 miles, forming a barrier between Monterey and San Benito Counties. Gabilan Peak, near the south end of the chain, is 3,381 feet above the sea, and Mount Cholame, 35 miles to the southeast, is 3,800 feet. This range extends from the Pajaro River on the north in a southeasterly direction throughout the entire length of the county. From the Pajaro River, going south, the first 18 miles of the range is a system of low mountains and small valleys, covered almost everywhere with grass and timber. The next 30 miles of the chain is composed of high, rough mountains, worn into deep and precipitous cañons, and covered with low chemisal. From the San Lorenzo to the southern boundary of the county these mountains are low, rolling hills, interspersed with numerous beautiful little valleys, among which are Peach Tree, Cholame, Indian, Long, Priest, and several others, all possessing a rich soil and a delightful climate.

The Santa Lucia Mountains extend from Carmel Bay, in an unbroken line southeast bordering the coast, as far as San Luis Obispo; then trending to the east and merging into the main Monte Diablo range. They are a rugged mass, with an average breadth of 18 miles, and over 5,000 feet in elevation at the highest point. The western portion of the range is particularly abrupt and inaccessible.

The Salinas River, after flowing through San Luis Obispo County, enters Monterey County a few miles north of the old Mission of San Miguel, nearly in the center of the southern border of the county. The Salinas River is the third in length in the State flowing into the Pacific Ocean. Its principal tributaries are the San Lorenzo and Estrella from the east, and the Arroyo Seco, San Antonio, and Nacimiento from the west. The Arroyo Seco empties into the Salinas about 30 miles southeast of Salinas City. About 18 miles up the stream the valley assumes the character of a cañon and leads back into the mountains in a southerly direction, heading away up in the Santa Lucia range. The Carmel is a beautiful stream of water, draining the hilly country north and east of the northern termination of the Santa Lucia Mountains. Its outlet is Carmelo Bay. San José Creek rises in the Santa Lucia Mountains, runs north and empties into the Carmelo. It is a noted stream for trout fishing. The Big and Little Sur Rivers have their sources in the same chain of mountains and flow westward into the Pacific Ocean. Elkhorn Slough is in the northern part of the county and runs westerly into the estuary of the Salinas River. The San Antonio and Nacimiento Rivers run throughout the upper part of their course in a direction opposite to that of the Salinas, or nearly in a southeast direction. For more than 30 miles they are nearly parallel, and 5 or 6 miles apart. The region between them is occupied by high ridges composed of bituminous slates, underlaid by sandstone.

The Salinas Valley, embraced by the Gabilan Mountains on the northwest and the Santa Lucia range on the southwest, opens out on Monterey Bay, and extends southward 100 miles, with an average width of 10 miles. Its area, therefore, is about 1,000 square miles, or 640,000 acres of land—almost an empire in itself. The Salinas River flows through the valley. The San Antonio hills stretch diagonally across the valley in two portions, the region above being a sort of table-land, of low, rolling hills, while below there is a valley, gradually opening out until, at Salinas City, it is 12 or 15 miles wide, and as fine a section for farming as any in the State. The lands of this valley may be divided into three classes:

First—The heavy, rich bottom lands, which will grow almost anything. The soil is mostly black adobe, and frequently contains just enough sand to make it work easily.

Second—The table-lands, which are particularly well adapted to growing wheat, barley, and other cereals, the average yield of wheat being about 30 bushels, and of barley about 50 bushels per acre.

Third—The uplands. Some of this land is the best fruit land in California, and will produce oranges, lemons, grapes, peaches, apricots, almonds, figs, apples, plums, berries, and other fruits common to this section.

The Pajaro Valley extends from the shore of Monterey Bay to the foot of the Gabilan Mountains, a distance of about 10 miles, ranging from 6 to 8 miles in width. The land is exceedingly fertile and under a high state of cultivation, producing immense crops of all kinds of grain, fruits, and vegetables. Well-tilled farms greet the eye, and villages, school houses, churches, and picturesque residences dot the landscape whichever way one turns. The foothills are covered with flocks and herds, and the lower ranges are timbered with live oak and madrona. The Pajaro River runs westerly through the valley, and finds an outlet in Monterey Bay.

The Carmel Valley lies 5 or 6 miles south of Monterey. The soil is very fertile, and the products of the valley are vegetables, grain, fruits, and berries.

Besides the valleys just described, there are numerous other small valleys in the county, among which may be mentioned San Antonio, Hames, and Sapaque Valleys.

Monterey Bay is about 30 miles wide, and circular in form. Point Pinos forms its southern and Point New Year its northern headland. Carmelo Bay is about 4 miles south of the town of Monterey. It is 4 miles in length and 2 miles in width, and has deep water, but is exposed to south and southwest winds. Cypress Point is situated at the northern entrance of Carmelo Bay, and is one of the grandest spots on the coast. The dark cypress trees, from which the point was named over three hundred years ago, cover the headland and skirt the water's edge.

Point Lobos juts out into the ocean at the southern extremity of Carmelo Bay. Point Sur is situated about 25 miles south of Monterey. The Sur River enters the ocean a little south of the point.

The climate of Monterey is very equable on the coast, the heat of summer being modified by the ocean breezes. In the interior it is much more variable, and during the summer months hot days are frequent. Violent and often unpleasant winds are unknown. A trade wind, or modified land and sea breeze, prevails most of the year. During the summer months this is moist, often with a sea fog. The cañons and little valleys of the mountainous districts have their temperature modified by these winds, and are unexcelled in their climatic conditions.

The average rainfall, in a record of seventeen years, has been about 13.50 inches, only once during these years so small as to greatly injure the industries dependent upon it. The rainless months are July, August, and September, while December, January, and February are the rainy months. Artesian wells, trade winds, and pumps can at all times be made to furnish an abundance of water for every purpose, except grain raising, and the water is excellent for irrigation.

The following table shows the rainfall at Salinas City for the past seventeen years; it was prepared by Dr. E. K. Abbott, of the United States Signal Service:

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	Total.
1872-3	0.00	0.00	0.01	0.02	0.02	6.80	3.40	2.40	0.80	0.00	0.00	0.00	13.45
1873-4	0.00	0.00	0.10	0.10	0.20	4.25	3.42	0.00	2.15	0.95	0.00	0.00	11.17
1874-5	0.00	0.00	0.00	1.83	1.42	0.00	4.50	0.15	0.69	0.00	0.00	0.00	8.59
1875-6	0.00	0.00	0.00	0.00	5.17	2.18	6.16	3.55	4.52	0.00	0.01	0.00	21.59
1876-7	0.10	0.00	0.05	1.04	0.05	0.00	2.54	0.16	0.30	0.10	0.40	0.00	4.74
1877-8	0.00	0.00	0.00	0.12	1.00	2.39	7.05	8.77	2.57	1.93	0.00	0.00	23.82
1878-9	0.00	0.00	0.05	0.60	0.20	0.35	2.42	2.81	1.85	1.69	0.82	0.15	10.94
1879-80	0.00	0.00	0.00	1.05	1.08	2.28	1.65	1.16	1.64	3.90	0.46	0.00	13.22
1880-1	0.00	0.00	0.00	0.00	0.57	5.56	3.32	2.32	1.26	0.66	0.00	0.38	14.07
1881-2	0.00	0.00	0.10	0.28	0.67	1.24	1.78	2.31	4.86	1.01	0.49	0.19	12.93
1882-3	0.00	0.00	0.38	1.43	0.65	1.95	0.91	0.95	2.26	1.28	1.98	0.00	11.79
1883-4	0.00	0.00	0.19	1.19	0.25	0.90	1.71	4.49	5.09	3.05	0.72	2.66	20.25
1884-5	0.00	0.18	0.11	1.79	0.28	4.46	1.09	0.05	0.19	1.21	0.12	0.00	9.48
1885-6	0.00	0.00	0.02	0.08	6.60	1.30	5.10	1.47	2.16	3.83	0.20	0.00	20.76
1886-7	0.00	0.00	0.00	0.62	0.82	0.72	0.75	4.73	0.54	1.63	0.07	0.00	9.88
1887-8	0.00	0.00	0.71	0.00	0.98	2.16	4.15	0.53	3.28	0.00	0.89	0.00	12.70
1888-9	0.00	0.00	0.56	0.00	1.64	2.20	0.64	1.65	3.31	0.95	0.68	0.00	11.63
1889-90	0.00	0.00	0.00	4.20	2.41	8.90	------	------	------	------	------	------	15.51

The temperature for five years, from the same authority, is given as follows:

	1885.	1886.	1887.	1888.	1889.
January—					
Highest	69.5	68.0	70.0	63.0	64.0
Lowest	33.0	29.0	28.5	44.8	27.5
Mean	48.7	49.2	46.9	64.0	44.6
February—					
Highest	75.0	73.0	72.5	74.5	*
Lowest	32.0	37.5	29.0	35.0	*
Mean	50.3	52.6	43.8	50.3	*
March—					
Highest	82.5	67.5	81.5	70.0	77.0
Lowest	36.0	35.0	33.0	[illegible]0.0	43.0
Mean	55.1	49.2	52.1	50.0	54.9
April—					
Highest	81.5	74.8	70.0	79.0	76.0
Lowest	41.0	38.5	40.0	41.5	48.0
Mean	56.5	51.7	51.8	54.2	56.3
May—					
Highest	76.0	77.0	70.0	74.0	87.0
Lowest	49.5	49.0	44.0	51.0	49.5
Mean	57.9	57.2	54.3	57.0	57.1
June—					
Highest	73.0	71.0	78.0	75.0	75.0
Lowest	51.0	51.0	50.0	51.0	51.0
Mean	56.4	56.9	58.5	62.0	61.1
July—					
Highest	73.0	76.0	72.0	84.5	77.5
Lowest	54.0	52.0	43.0	54.0	53.0
Mean	61.4	58.9	56.9	61.4	59.5
August—					
Highest	75.5	78.0	70.0	76.5	75.0
Lowest	57.0	53.0	53.0	52.0	52.0
Mean	58.9	59.6	56.9	59.5	59.6
September—					
Highest	82.0	88.0	78.0	93.5	88.0
Lowest	47.0	46.5	47.0	47.0	48.0
Mean	58.9	58.5	58.1	59.6	60.1
October—					
Highest	72.0	69.0	91.5	82.5	94.0
Lowest	38.3	39.0	42.0	40.0	44.0
Mean	56.3	52.5	58.5	55.7	55.1
November—					
Highest	72.0	80.0	78.0	77.0	78.0
Lowest	30.0	31.0	28.0	31.0	38.0
Mean	52.7	49.2	51.9	55.6	54.2
December—					
Highest	74.0	77.5	68.5	67.0	65.0
Lowest	32.0	32.0	32.0	37.5	34.7
Mean	52.0	49.8	46.0	51.6	48.9

* Absent in the East.

Most semi-tropical fruits do well in some parts of Monterey County, as also do the principal varieties of the temperate zones. Apples, pears, plums, quinces, prunes, and cherries grow splendidly in the Salinas Valley, and, in fact, all over the county. Peaches and apricots arrive at great perfection in the foothills, cañons, and small valleys; while the fig does well in sheltered places. Many portions of the county seem adapted to oranges, lemons, and limes. At the present time the orange and lemon trees at Escolle's place, a few miles up the Salinas River, and at the Underwood farm, in the Corral de Tierra, are hanging full of excellent fruit. Olive trees flourish with all the vigor that they possess on the Mediterranean coast, and in many localities almonds do exceedingly well. Currants, gooseberries, blackberries, and raspberries grow luxuriantly. Strawberries are in the market the year round. Grapes grow to perfection almost everywhere in the county except in the heavy bottom land of the Salinas Valley, and even there grapes are produced that it would be hard to beat. More attention is now being given to the planting of orchards and vineyards than heretofore. Thousands of fruit trees and vines have been set out during the past few years, and many of them are in bearing.

Experience gained in the varied climate of the county is gradually bringing about a policy of growing principally the varieties of fruit that long experience and careful trial have demonstrated best adapted to any particular locality. A large area of Monterey County has selected the apple and pear as the leading fruits for this locality. Prunes also do splendidly here. The San Miguel Cañon, Carneros, and numerous other valleys adjacent to the Gabilan and Coast Range of mountains, are known to be admirably adapted to the growing of grapes, peaches, apricots, and citrus fruits; while the great Salinas Valley, with its cool, moist, equable climate, has been demonstrated as one of the best localities in the State for growing the apple and pear. In the market, apples grown in this locality bring from 25 to 75 cents a box above average prices. Some apple orchards in the vicinity of Salinas bring in an income of over $250 per acre, and larger returns are derived from cherries.

The chief fruits of Monterey County are apples, peaches, prunes, plums, pears, nectarines, almonds, and grapes, in order. There are a great many small growers scattered through the county, and nearly all cultivate small orchards to some extent, and with success. No attempt has yet been made to grow citrus fruits, except in a few instances, where an occasional orange tree has been planted. Olives have been tried to a limited extent, and so far, give promise of doing well. Mr. Hiram Westlake, of Jolon, has olive trees in bearing, and they yield very large returns.

There is a great deal of excellent land in this county adapted to deciduous fruits, especially apricots, peaches, prunes, and almonds.

The oldest orchards of the county are those at the old Missions. There was one of these at San Miguel of considerable extent, but nothing remains of it at the present time.

Nothing is done in the way of irrigation in Monterey County, except in a private way. Many of the ranchers and fruit growers rely upon surface and artesian wells and windmills for their water.

The principal fruit section is in the Salinas Valley, the soil of which is a deep, sandy loam, with occasional patches of adobe.

A shortage in fruits of all kinds is reported from Monterey, the average being from 25 to 30 per cent below that of ordinary years. Mr. A. McCusker, of Salinas, estimates the output of fruits in his district for 1891, at about $3,000 in value. The local demand was not good, and there being no çanneries in the county, a large amount of fruit and berries perished. There has been a small area of new fruit planted during the present year.

ACREAGE AND VARIETY OF FRUITS IN MONTEREY COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	249	101	350	35
Apricot	425	158	583	60
Cherry	18	10	28	5
Fig	7	10	17	3
Olive	42	10	52	2
Peach	150	26	176	12
Prune	566	520	1,086	150
Pear	85	16	101	7
Plum	21	9	30	2
Nuts—Almond	10	10	20	17
Walnut	7	16	23	4
Totals	1,580	886	2,466	297

NAPA COUNTY.

Napa County lies northeast from San Francisco about 40 miles, and is 70 miles southwest from Sacramento. It has an area of 789 square miles, or 450,000 acres, and is bounded on the north by Lake and Yolo Counties, on the east by Yolo and Solano Counties, on the south by Solano County and San Pablo Bay, and on the west by Sonoma County. Napa is one of the smallest counties in the State, but at the same time one of the most important. Its length is about 50 miles with a varying width of from 30 to 35 miles. Spurs of the Coast Range Mountains pass through it, most of which have a northerly trend. Between these spurs lie several rich and very productive valleys, where the soil is very rich, the climate congenial, and the scenery unsurpassed.

The western line of Napa passes along the ridge of a chain of mountains, the entire length of the county. East of this chain lies the beautiful Napa Valley, extending from Mount St. Helena at its northern end to San Pablo Bay on the south, and varying in width from 1 to 5 miles. The only valley of importance intersecting the slope on the western range, is Browns Valley, which lies northwest of Napa City, and is a lovely and productive little glen. White Sulphur Springs Creek, Dry Creek, and Carnero Creek flow down from these mountains, emptying into Napa River, a stream which extends the entire length of the valley and is navigable as far up as Napa City. The lower end of Napa Valley opens out fan-like to quite a wide expanse, and is low, flat tule land. Midway between the two extremes of Napa Valley and near its center from east to west is Yountville Hill. Mount St. Helena, at the head of the valley, rears its summit nearly 4,500 feet above the level of the sea. A chain of mountains extends along the entire length of the eastern side of Napa Valley, being broken by a few streams and cañons. Conn Valley is a small widening of the valley through which the creek of the same name passes.

In the eastern range of mountains there are some high peaks, such as Bald Peak, Atlas Peak, Howell Mountain, etc., ranging in height from 2,000 to 3,000 feet. The eastern and western ranges unite at the northern end of the county, Mount St. Helena forming the point of union. Over the Howell Mountain grade, at the east of Napa Valley, lie the broad and fertile fields of Pope Valley, and over a low divide to the south of Pope is Chiles Valley; a high range of mountains on the eastern side of Pope and Chiles Valleys separates them from Berryessa Valley. This valley is drained by Putah Creek. Off the road from Napa to Berryessa are the small and lovely glens of Capelle, Gordon, and Wooden Valleys.

The climate of Napa will compare favorably with that of any of the interior counties. Its situation with regard to the bay and ocean is such as to yield it all the benefits to be derived from their proximity, while its interior position and mountain ranges deprive it of their discomforts. The rainfall averages so well that a shortage of crops is unknown. The influence of the ocean breeze is felt here during the summer months to an extent amply sufficient to temper the sun's heat, while the hills act as a barrier against the fogs. The foothills of Napa County are especially famed for their climatic features, and here are found some of the most noted health resorts in the State. In the thermal belt of the foothills is found a mild and equable climate the year round, and citrus and other sub-tropical fruits will grow there. In the spring the mornings are cool and bracing, the days bright and pleasant. During the summer the weather is warm, but the heat seldom becomes oppressive, the thermometer rarely registering higher than 90°. The rains of winter are interspersed with warm, sunny days. In the valleys during the winter months there are frequent frosty nights and sharp, cold mornings, but rarely sufficient frost to injure the fruit crop.

Following is a table of the average rainfall at Napa, Calistoga, and Knoxville, which gives a fair idea of the precipitation in this county:

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Napa	5.88	3.87	3.61	2.98	.98	.27	.00	.00	.62	1.64	1.47	2.84
Knoxville	4.06	8.09	11.72	6.19	.16	.00	.00	.00	.00	1.92	.85	1.54
Calistoga	7.32	5.02	4.90	2.98	.90	.39	.00	.00	.29	2.22	2.85	4.41

The soil of Napa County may be divided into five classes. The first class, termed argillaceous, is common to the mountains on the east side of the county, and is not very productive. In Berryessa and Chiles Valleys there is a large percentage of this soil mixed with a rich loam, adapting these sections to grain growing. The second class, adobe, does not exist to any great extent, and is found only in spots in Berryessa, Pope, Chiles, and Browns Valleys. It is a stiff, cold, and disagreeable soil, not easily worked. The best soil is the loam, which may be found in all the valleys of the county, but principally in Napa. It is a rich alluvium, well adapted to all sorts of vegetable growth, and especially suited to fruit. Tule soil is found from Napa City southward, and along the margin of the bay. The last class is lava, a decomposed volcanic formation, and is excellent for vineyards. It is found in the vicinity of Howell Mountain.

Napa's great industry is in wine making, and her viticultural interests are greater than those of any other county in the State. Other branches of horticulture are followed, however, and with great success. The olive has been planted extensively upon hillsides which are almost useless for other fruits, and the tree thrives and promises to become a great source of wealth. Adolph Flamant planted here a large orchard for the Los Guillicos Olive Company some three years since. About one third of the trees in the orchard are now in full bearing, and the whole orchard promises well. In speaking of the olive in Napa County, Mr. Flamant says: "The climate of Napa Valley and its surrounding sections is admirably suited to olive culture. It corresponds strikingly in its main features with that of the south of France and northern Italy, whence come the best imported pickled olives and olive oil. The olive tree needs a temperate climate, and dreads equally excessive cold or hot weather. It requires less labor and care than any other tree. It will grow to better advantage on high and stony land, comparatively useless for any other culture. There it will bear quicker and heavier than in a rich soil, its degrees of productiveness ranging from forty to a hundred gallons per tree, when the tree has reached its full development. It has been repeatedly demonstrated that in the exceptional soil and climate of California, and when planted with the one-year old rooted cuttings, it begins to bear when four years old. It enjoys an almost incredible longevity, since many modern travelers report having seen trees in Asia Minor which are over two thousand years old. Add to the above the simplicity and cheapness of the apparatus needed for oil making and olive pickling, the easiness of handling the crop, the rapidity with which it can be turned into a trade, as well as the cheapness of transportation of the product, considering its great value under a small volume, its immense consumption in all parts of the civilized world, and it will be easily conceived why olive culture is going to stand foremost among the industries of California."

Napa also produces deciduous fruits of all kinds, in quantity and quality equal to the best favored sections of the State. The prune especially does well here, and much attention has been paid to it of late. Apples and pears do well in all parts of the county, but make the best returns in the more elevated situations on the mountain slopes. Walnuts, almonds, apricots, peaches, cherries, and all the small fruits are raised to perfection, and without the aid of irrigation. While Napa makes no claim to superiority, or even to general adaptability to the growth of citrus fruits, yet there are many locations in the county where these thrive and yield good crops. All through Napa Valley, and especially in the foothill thermal belt, may be seen little orchards containing from half a dozen to several hundred trees, all of which are in as thrifty a condition as is possible, never having been attacked by the scale, and producing large crops of fruit, from 800 to 1,500 oranges having been gathered from a single tree.

At Calistoga the apricot does not do well in the valley, but with an elevation of several hundred feet does first rate. Oranges also do well under the same conditions. The fruits most profitably grown in this district are Royal apricots, peaches, and prunes.

The fruits chiefly recommended for planting in this district are: Petit d'Agen prune; Early and Late Crawford, Hale's Early, Susquehanna, Alexander, and Salway peaches; Royal apricot, Silver prune, and olives on the hills.

The chief fruit sections of Napa County are Calistoga, Browns Valley, Oak Knoll, and St. Helena. The favorite fruits, being those which are found to be best adapted to the soil and climate, are peaches, prunes, and plums, with occasionally some cherries. An experiment was made in citrus fruits, and three thousand orange trees were planted last season near St. Helena, which have so far done remarkably well.

The principal markets for the fruit of Napa County are found in San Francisco and San José, although during the past few years the cherry crop has found a market in the Eastern States. The fruit is mostly marketed green, and finds its way to the canneries, except prunes, which are dried. The present season's crop has been small, peaches running about two thirds, prunes one third, plums less than one third, and cherries two thirds of an average yield, while pears promise to give a full crop.

The oldest orchards in this county are the Suseal orchards, planted by Simpson Thompson in 1853. Most of the trees were imported from Rochester, N. Y., and from New Jersey, and comprised apples, cherries, peaches, pears, and prunes. This orchard now belongs to Mr. Allen, of San Francisco.

The orchard industry of Napa is second to the wine industry, Napa being one of the leading wine counties of the State. Wine grapes are grown very extensively in all parts of the county, and it is only of late years that much attention has been paid to orchard fruits; but the decline in the demand for, and prices of, wine has given an impetus to tree planting over that of vines, and during the last few years a very large area has been set to prunes, peaches, apricots, and other deciduous fruits.

Berries of all kinds also do well in this county, and yield very heavily. Mr. W. A. Truebody, who has a place some 7 miles north of Napa, says: "I have raised and marketed on my farm from 3 to 3½ tons of blackberries as an average crop, without irrigation." C. H. Starkweather, 2 miles north of Napa, states that he has netted $112 from eleven Royal Ann cherry trees, $26 from five prune trees, about $350 per acre from currants, and $125 per ton for table grapes. Prof. W. C. Damon, of Browns Valley, reports having cleared over $200 per acre from Bartlett pears.

ACREAGE AND VARIETY OF FRUITS IN NAPA COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	215	46	261	12
Apricot	70	128	198	43
Cherry	140	120	260	40
Fig	10	13	23	5
Olive	43	62	105	21
Peach	527	318	845	106
Prune	311	816	1,127	234
Pear	200	86	286	33
Lemon	1	3	4	1
Orange	5	11	16	4
Nuts—Almond	27	50	77	12
Walnut	12	28	40	7
Table grapes	6		6	
Small fruits	12		12	
Totals	1,579	1,681	3,260	517

NEVADA COUNTY.

Nevada County is bounded on the north by Sierra and Yuba Counties, on the west by Sutter and Yuba Counties, on the south by Placer County, and on the east by the State of Nevada. It extends from the summit of the Sierra Nevada range, on the east line of the State, westward to the Sacramento Valley, a distance of 70 miles. It is from 12 to 20 miles in width. On its western line it has an elevation of about 1,000 feet, increasing to 2,000 or 3,000 feet in the central portion, and 8,000 feet along its eastern boundary. It has an area of 1,125 square miles, or 710,000 acres. Its natural boundaries are the South Yuba and Bear Rivers on the south, and the Middle Yuba River on the north. The general course of these rivers is from northeast to southwest, and through the northern and central portion it is partly divided by the South Yuba River, which unites with the Middle Yuba near the western boundary of the county, and forms the main river, which is a tributary of the Feather River. The western and middle portions of the county present a pleasing variety of landscapes in wooded hills, small valleys, or rolling uplands, a large part of which is well adapted to agriculture and grazing, and to the cultivation of orchards and vineyards. Along the extreme western boundary citrus fruits grow to perfection, as do the olive and other sub-tropical fruits, while through the central portion, in which are located Nevada City and Grass Valley, at an altitude of 2,500 feet, the Bartlett pear, and other fruits of the temperate zone, reach their best development in flavor, while at an altitude of 3,500 feet, and 400 feet farther up the mountain slopes, the apple attains a superiority unequaled by similar fruit raised at lower elevations. The variety in soil, the difference in temperature, and accessibility of transportation, are encouragements to fruit and vineyard culture that are making a valuable and profitable production, steadily growing in importance, and which will in the near future prove a source of considerable local wealth.

With so much variation in altitude, from 1,000 to 8,000 feet, there is of necessity a great difference in the climate of the different portions of Nevada County, and while one section enjoys all the advantages of California climate, others are exposed to the rigors of an Eastern winter. At Grass Valley the climate is in all respects healthful and salubrious. Its elevation above the lowlands of the Sacramento Valley lifts it above malarial influences, and its middle and mountain sections are inviting to those seeking health and recreation. The temperature is comparatively mild at all seasons. In the summer, when the days are hot in the foothills, in the mountains the atmosphere is tempered to agreeable moderation, while the nights, at even the lowest altitudes, are always comfortably cool.

There are but a few days in the year when the thermometer marks above 85°, and in winter it is seldom that the temperature goes below the freezing point in the middle section of the county; but in the Truckee Basin, which is east of the Sierra, it falls below zero, and makes it practicable to harvest ice in large quantities, which, as an article of traffic, finds an extensive market in all parts of the State.

The summer season is dry. Occasionally showers fall in the early part of June, but during the remainder of that month, and through the months of July, August, and September, rain seldom falls, and usually in October the showers are light. The remaining months of the year comprise what is known as the rainy or winter season. In the lower foothills snow is rarely seen, and in the middle section attains but a moderate depth. It does not remain long on the ground, owing to its moist and unfrozen condition. In the higher mountains snow falls to considerable depth, covering the summit ranges, and remains late into the following summer months; and on the northern side of the higher peaks snow may be seen at all seasons of the year. It is the variety of climate, difference of elevation in the country, and the picturesqueness of the landscapes presented that makes Nevada County particularly inviting as a home, or attractive to the tourist, who always retains a pleasing recollection of a visit to this interesting and beautiful region.

The rainfall for the season is not often excessive, the average annual precipitation being about 50 inches; but there are exceptional years in which there is a variation of 8 or 10 inches above or below these figures. These figures vary, too, with the altitude, the precipitation of the higher lands and mountains being much heavier than in the valley region. The annual rainfall makes the failure of crops an impossibility, and generous harvests are almost invariable.

The abundance of rain and the melting of snow in the mountains afford an adequate supply of water for the canals and artificial reservoirs, that can be used either for the purpose of mining or irrigation, and for the latter the demand is steadily increasing for clover and grass lands and orchards.

The soil of Nevada County, in its analysis, is similar to that of Placer County, and with proper cultivation is capable of producing cereals and fruits without the aid of irrigation. Wherever irrigation has been used, crops of every character have been raised in remarkable abundance. Around Nevada City and other places where granite comes to the surface, it is decomposed and more or less intermingled with alluvial soil, and is well adapted to horticultural pursuits. Another variety of soil is found in the loam of the hillsides, which are frequently tinged a dull red, and which in its natural state supports a thrifty growth of chaparral and forest trees. This soil is free from stones and easy of tillage. A third variety is a mixture of rounded bowlders and loose rock, uninviting in appearance, but still desirable land. A fourth variety is that in which the slate rock crops out along the surface, offering apparently no inducement to the horticulturist, yet excellent results are obtained from this, as is evidenced by the flourishing vineyards in the Colfax district.

There is an abundance of water stored in artificial reservoirs along the summit of the mountains, such as no other county equals. Originally these artificial lakes and expensive ditches were constructed to supply hydraulic mines. The length and capacity of the main ditches connected with the reservoirs, and size of lakes of the several companies, are as follows:

Name of Company.	Main Ditches, Miles.	Capacity, Inches.	Cost.
North Bloomfield	157	3,200	$708,841
Milton	80	3,000	391,579
Eureka Lake	163	5,800	723,342
South Yuba	223	7,000	2,000,000
Excelsior	160	5,000	1,000,000
Totals	783	24,000	$4,823,762

Principal Lakes.	Area, in Acres.	Capacity, Cubic Feet.	Size of Dam, in Feet.
Bowman	950	1,000,000,000	100x420
French	337	660,000,000	54x200
Weaver	100	1,130,000,000	68x100
Fordyce	790	1,800,000,000	90x700
Sterling	120	300,000,000	40x80
Totals	2,297	4,890,000,000	

Nevada County holds a prominent position among the fruit-growing counties of California, and with her great variety in soil, climate, and altitudes seems well adapted to nearly all varieties of fruit. Orchards of fruit, nut-bearing trees, and vineyards of the choicest table, raisin, and wine grapes are specialties. It having already been shown that while California, as a whole, beats the world in this direction, these foothills equal any other part of California in the quality, and in some things, as pears and winter apples, for special adaptation and regular productiveness. Within the past few years hundreds of acres have been planted in fruit trees and vineyards, and they all thrive well. Wine made from grapes grown on Nevada's foothills has an enviable reputation. Table grapes are par excellent, and the raisin does remarkably well.

The abundant rainfall is especially propitious for the growth of the Bartlett pear, which here reaches its perfection of growth. This fruit finds a ready market in Eastern States and brings good prices. It is a common occurrence to have trees yield 700 and 800 pounds, and they uniformly sell for 1½ cents per pound, which admits of big profit.

Oranges grow well here. In at least half of the circuit, in all that part below the bench upon which Grass Valley is situated, in the lands 1,000 to 1,600 feet above sea-level, the thermal belt of the foothills, the citrus fruits are at home.

Of course, any kind of fruits adapted to temperate zones flourish in Nevada County. The olive, fig, prune, and all kinds of berries are numerous.

Around Nevada City the soil, which yields so abundantly to the miner, gives rich recompense to the horticulturist. Not only are the house yards of town residents mainly devoted to the growing of apples, pears, peaches, cherries, prunes, berries, grapes, and nuts, but the contiguous country is fast being converted into a veritable garden by sturdy and far-sighted toilers, whose orchards and vineyards dot the hillsides in every direction.

With an average annual rainfall of 52 inches, an altitude above sea-level of 2,600 feet, a temperature that seldom if ever drops below zero in midwinter, or rises more than 96° above that point in summer, and with a deep and rich soil, it is no marvel that fruit growing succeeds here, and that the income from this source is growing larger with each passing year.

The principal fruit sections of Nevada are Chicago Park, Grass Valley, Nevada City, San Juan, French Corral, Rough and Ready, and Anthony House. The chief fruits grown in these sections are apples, pears, peaches, plums, cherries, grapes, and nuts.

From points contiguous to railroads much of the fruit produced in this county is shipped direct to Eastern markets. Next comes home and local consumption; then the mining, grazing, and lumber country to the east and north, where no fruit is raised. Some winter apples are shipped to the lower valleys.

The fruit for Eastern shipment is packed in regular standard boxes and crates, and for the mountains and mining trade in all sorts of packages, as the fancy of the seller may dictate.

The output of fruit in Nevada County for 1891, together with an estimate for the present year, are given below:

	1891—Pounds.	1892—Pounds.
Apples	7,000,000	2,000,000
Apricots	300,000	2,000
Cherries	500,000	10,000
Peaches	325,000	25,000
Pears	2,200,000	600,000
Plums	122,000	4,000
Almonds	140,000	74,000
Walnuts	280,000	90,000
	10,867,000	2,805,000

As will be seen from the above, there has been a very large falling off in the output of fruit for 1892 over the season of 1891. Peaches, apricots, plums, and cherries were nearly all destroyed by a late frost, so heavy as to destroy the young leaves on the trees. Cold rains coming later in the season also hurt the apples, pears, and other varieties of fruit.

The prices paid for fruit in Nevada County this year are a very material increase over those of last season, the prices per pound of both seasons for various fruits being appended:

	1891.	1892.
Apples	1 to 2c.	2 to 2½c.
Apricots	1 to 1½c.	1½ to 3c.
Cherries	5 to 10c.	6 to 10c.
Peaches	2 to 3c.	5 to 6c.
Pears	1 to 1½c.	1½ to 2½c.
Plums	¾ to 3c.	3 to 5c.
Almonds	9 to 12c.	10 to 13c.
Walnuts	8 to 9c.	9 to 12c.

These prices are for dried fruit.

The area now planted to fruit in Nevada County is from 1,500 to 1,600 acres, of which from 175 to 225 acres were planted during the season of 1891.

Some of the oldest orchards in Nevada are those of the Barker ranch, owned by E. Sherman; Mr. William Towne's orchard; the Butler ranch, owned by George Butler; the James vineyard, and that of J. C. Cole. That owned by J. C. Cole was set to apples, peaches, and pears as early as 1855, the stock being from seedlings procured from Marysville.

Acreage and Variety of Fruits in Nevada County.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	300	60	360	20
Apricot	15	26	41	12
Cherry	10	16	26	5
Fig	4	10	14	3
Olive	2	11	13	4
Peach	226	100	326	28
Prune	45	20	65	10
Pear	249	407	656	93
Plum	4	5	9	2
Orange	½	1½	2	1
Nuts—Almond	14	10	24	3
Walnut	13	6	19	1
Raisins	14	----------	14	----------
Table grapes	105	----------	105	----------
Small fruits	4	----------	4	----------
Totals	1,005½	672½	1,678	182

ORANGE COUNTY.

Orange County is, next to Glenn, the youngest county of California, having been organized by the legislative session of 1889, from a portion of Los Angeles County, which bounds it on the north; on the east is San Bernardino and on the south San Diego County, while its entire western border, a distance of 40 miles, is skirted by the Pacific Ocean. Its area is 665 square miles, or 425,978 acres. This is divided into mountains, 65 square miles; foothill, 100 square miles, and valleys, 500 square miles.

The Santa Ana range of mountains is the line between Orange and San Bernardino Counties at the northeast corner of the former county. It is also the dividing line between Orange and San Diego Counties on the east. This range also sends up a line of foothills westwardly along the seashore nearly half way across the county. All of the western portion of the county is included in the Santa Ana Plain, or Valley. There are also several small valleys among the foothills and along the mountain streams. The Santa Ana Plain is covered with rich loam, and, with the exception of some patches of alkali, is very productive The highest point of land is what is locally known as Saddleback, or Santa Ana Peak, with an elevation of 5,675 feet.

There is an abundant water supply in this county. The Santa Ana River enters the county near the northeast corner, and traverses the entire Santa Ana Plain, flowing into Newport Bay. Besides this stream there is Santiago Creek; also Aliso, Trabuca, Mission Vieja, San Juan, and Coyote Creeks, and other streams. The last-named creek forms the boundary between Orange and Los Angeles Counties on the west. Apart from these streams there are probably one hundred natural flowing wells and one thousand artificial wells. The latter can be increased indefinitely, water being obtained from 35 to 250 feet. The water is sweet and pure, and practically inexhaustible. A vast sheet of water, percolating through underlying gravel deposits, may be reached in almost any portion of this fine valley, and, in connection with the running streams referred to, affords all the water needed for irrigating and other purposes.

The climate of Orange County does not differ to any great extent from the climate of Los Angeles. On the immediate coast heavy fogs are common in the early spring months, but these are not of long duration, nor do they usually extend far into the interior. As the matter of temperature and precipitation is treated of under the Los Angeles caption, no further allusion need be made to it here.

In the foothills of Orange County a sharp, gravelly loam of a reddish color prevails. Descending into the valleys this loam loses its color and its sharpness and becomes black, with a large admixture of adobe and frequent streaks of alkali.

Beginning about one mile west of Santa Ana is a deposit of alkali. Here is a strip about 10 miles long, which will average something like a mile in width, and on the west side of the Santa Ana River patches of this mineral may be found impregnating the soil in the vicinity of Westminster and Garden Grove. West of the Santa Ana River large deposits of peat are found, the product of tule roots and other swamp vegetation. This varies in depth from a few inches to 16 feet. This land is considered the best for agricultural purposes in the county, and is held at a high figure by its owners.

Three systems of irrigation have been adopted in this county. One, the Santa Ana Valley Irrigating Company, is working under an ordinary corporation. It is confined to the Santa Ana Rancho, and obtains water from the Santa Ana River. Each acre is counted a share, and at present extends to 20,000 acres. Another is organized under the Wright Act, and is called the Anaheim Irrigation District, and includes 32,000 acres about that town. The company has issued bonds to the amount of $60,000 to buy out a private company, and to extend its system of ditches. It also obtains water from the Santa Ana River. The John Carpenter Water Company embraces a territory of about 3,000 acres. Its source of water supply is Santiago Creek. Besides that above mentioned, there are some 25,000 acres that can be irrigated from artesian wells.

All the fruits do well in Orange County. Many varieties of oranges and several of lemons are grown in this county, taking their names generally from the party introducing them, the country from which brought, or a peculiar marking of the fruit. The Mediterranean Sweet, Washington Navel, Valencia, Kohna, and Mission, or Seedling, are the varieties generally preferred. Of lemons, the Genoa, Eureka, and Lisbon may be named.

Oranges are shipped from here from the last of December until June, the bulk in March and April.

There is an impression abroad that while Southern California is especially adapted to oranges and other semi-tropical fruits, it is not well suited to the culture of deciduous fruits, especially apples. There are some portions of Orange County where apples are grown which vie with those of the Eastern States or Oregon in size, flavor, and appearance. The error is partially excusable, because it is only during the past few years that much fruit besides oranges and grapes has been grown here. Now, however, large orchards are annually being planted to almost every variety of fruit that is known.

The principal fruit sections of Orange County are Westminster, Garden Grove, Anaheim, Orange, Santa Ana, Fullerton, Placentia, and Tustin, and apricots, peaches, apples, oranges, lemons, figs, prunes, and walnuts do well in this county, apricots especially holding front rank, with walnuts in the second place.

The larger amount of the fruit produced in Orange County finds a market in the East, the citrus fruits and walnuts being shipped entirely out of the county. The deciduous fruits are very largely disposed of to the fruit-drying establisments and packing houses, and by them shipped both dry and green to the Eastern States. Fullerton alone shipped in the season of 1891, 50 carloads of oranges, 1 carload of lemons, and 4 carloads of walnuts.

Capistrano reports 6 carloads of oranges shipped in 1891, 9 carloads of walnuts, and about 65 tons of other fruits.

There has been a very considerable acreage of new fruit planted in Orange County during the present year, a very large percentage of which consists of citrus fruits. Small fruits are not grown to any extent, but where cultivated give a very large yield.

The crop outlook for the present year is generally good, excepting for prunes and other stone fruit. The walnut yield will be fully up to the average, and the citrus fruits are promising to return more than the average yield.

ACREAGE AND VARIETY OF FRUITS IN ORANGE COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	86	42	128	42
Apricot	1,112	380	1,492	350
Fig	33	49	82	49
Olive	39	31	70	31
Peach	1,016	187	1,203	100
Nectarine	30		30	
Prune	1,657	131	1,788	101
Pear	670	133	803	103
Plum	5		5	
Lemon	251	230	481	122
Orange	5,286	126	5,412	126
Nuts—Almond	2		2	
Walnut	1,467	1,125	2,592	1,000
Raisins	422	504	926	504
Table grapes	130	30	160	30
Totals	12,206	2,968	15,174	2,558

PLACER COUNTY.

Placer County lies between latitude 38° 70′ and 39° 30′. Its direction is northeast and southwest, and it is about 100 miles long and of varying widths, from 10 to 30 miles, the course and distance being defined by the course of the rivers which define its boundaries. It extends from about 8 miles from the Sacramento River to the summit of the Sierra Nevada

Mountains. Just above Auburn, between the Bear and American Rivers, the county is very narrow, being but about 8 miles across. Above Auburn it widens out into the two divides lying between the Bear River and the Middle Fork of the American River. These are known as the Dutch Flat, or Railroad Divide, and the Forest Hill Divide. The southwestern portion of the county is more regular in shape than the part just described, being bounded on the east by El Dorado County, on the south by Sacramento, on the west by Sutter County, and on the north by Nevada County. This section contains the foothill and agricultural lands. Its shape is nearly a parallelogram, the southwest two thirds being on the plain proper and the northeast one third being the foothill and fruit district.

The area of Placer County is 1,429 square miles, or 950,000 acres. Of this 810 square miles are mountains, 450 square miles foothills, and the remainder valleys. The entire extent of the county faces toward the west, extending from an altitude on the plains in the western portion of the county of some 40 feet to over 7,000 feet at its eastern boundary line, embracing nearly every variety of climate known in the State. At the eastern boundary of the county, separating it from the State of Nevada, is Lake Tahoe, one of the most picturesque lakes in America. The topography of Placer County is as irregular as is its shape. Imagine the whole Atlantic Coast from Labrador to Tallahassee incorporated into one county, and one will have a fair idea of what may be found in Placer, exaggerated as to size, but not as to the great variety of climate, elevations, soils, and resources.

In fact, as to resources, the whole Atlantic seaboard can hardly equal the endless variety to be found within the borders of this single county, which rivals Florida in the quality of its oranges, excels New Jersey in peaches, equals the New England States in its granite quarries, and compares favorably with Maine in the quality of its lumber.

From an elevation of about 2,500 feet up to the summit of the mountains snow falls in the winter season, light at the lower edge of the line, and increasing in depth as it ascends the Sierra. Here is a strip of territory from the snow line up to an elevation of 3,000 feet, where the snowfall is not greater than in New England, and where the winter temperature is much higher. It is particularly well adapted to the apple, the pear, and a great variety of vegetables.

At Auburn, the county seat, the average temperature for winter is 46.2°; for spring it is 56.4°; summer, 74.3°; autumn, 61.7°. The yearly mean of the maximum temperature at Auburn is 83.17°; at Colfax, 85.42°; at Rocklin, 84.33°.

The average annual rainfall at Colfax is about 46 inches, and at Auburn it is about 26 inches.

The soil of the western or valley portion of Placer County around Roseville, Lincoln, and Sheridan, is of the same general alluvial composition as all the soil in the great Sacramento Valley, and is well adapted to the growth of grain. Over 30,000 acres are annually devoted to wheat, barley, oats, and hay. The low foothills back of Lincoln are excellent for the grape, and many new vineyards are springing up in that locality. They produce table grapes, wine, and raisins of superior quality.

The soil of the valley lands is mostly a red loam, mixed with considerable clay in spots; that of the foothills is a gravelly red loam, in places light and sandy, and is excellent for the production of fruits. Farther up the soil changes to a red character with a slate bedrock. This, too, is very fertile. The agricultural region includes the valley and foothill lands all the way from the western boundary of the county to an elevation above Colfax. The foothills everywhere possess a soil which only needs cultivation. The granite soils around Newcastle are composed largely of clay, sand, soda, potash, lime, phosphorus, iron, and magnesia. The constant decomposition that is going on appears to be of nearly endless duration, and of such a nature as to render the soil almost inexhaustible. Artificial fertilization is entirely unnecessary.

For an irrigation water supply Placer has three sources—the Yuba, Bear, and American Rivers. Including its branches, the Bear River irrigation ditch is 200 miles in length. This system is now the property of the South Yuba Water Company, who have increased its capacity and bring water from the Yuba River, so that abundance of water is assured. There are several other canals originally built for mining but now used for irrigation.

Placer County holds a foremost position among the fruit counties of the State, being the most easterly of the counties of California. With the Central Pacific Railroad running the entire length of her territory, she is one day nearer the Eastern market than any other part of the State, a very large item in the shipping of green fruit to market. In her thermal belt fruit ripens earlier than in most other places in the State, another large advantage to her. There is hardly any fruit in the entire range of production that will not grow in some portions of Placer. Pears, plums, prunes, apples, apricots, cherries, persimmons, pomegranates, quinces, and figs all do well. Peaches have been grown to some extent for the past twenty-five years, and in all that period a failure of a crop has been unknown. Some fine oranges have been produced, and Placer holds a position beside Butte in the northern citrus belt. In the production of small fruits, berries, and table grapes, Placer holds a foremost place.

The granitic belt from Rocklin to Newcastle is one of the foremost fruit districts of California. Its rolling lands are covered with orchards and vineyards. The chief fruits are the cherry, fig, nectarine, peach, olive, and orange, in all of which it excels. No other section produces earlier fruits, and it is estimated that for the last three or four years Placer County has shipped about one seventh of all the green deciduous fruit sent East from California.

There are large shipping houses at Loomis, Penryn, Newcastle, Auburn, and Colfax. Newcastle does the heaviest forwarding business, and the total shipments from the county have increased from 6,000,000 pounds in 1886 to 7,459,688 pounds in 1887, 12,000,000 pounds in 1888, and about the same proportionate increase for 1889 and 1890.

The decomposed granite soil of the fruit belt just mentioned requires plenty of irrigation for the best development of fruit and vegetables, and water is supplied in abundance by the Bear River Ditch, owned by the South Yuba Water Company. The main line of this ditch is 60 miles long, and its branches give the farmers of Placer a total of over 100 miles of ditches for irrigating purposes. This service will be increased next year by the continuation of an old mining ditch, which now ends at Gold Run, to a point below Colfax, where the present Bear River Ditch comes out on the divide above Auburn. This new ditch will have a capacity of 5,000 inches, and the same company will also build a new storage reservoir above Bear Valley, in Nevada County, to supply the increasing demand in Placer.

Placer County is a very large producer of peaches, Bartlett pears, plums, and table grapes. These are the chief fruits produced here, although nearly the whole range of temperate and semi-tropical fruits is grown. Almost the entire fruit crop of this county is sent green to the East. The Central Pacific passes along the entire length of Placer, which is the nearest fruit section in California to Nevada and the East. As a result, fruit from this county reaches market much earlier and in better condition than it does from more remote counties. There are no packing houses or driers here, and the entire crop may be said to reach market green. For shipment, pears are packed in 40-pound boxes, peaches in 20-pound boxes, plums and table grapes in 20-pound crates, and cherries in 10-pound boxes.

Pears and peaches are wrapped separately in paper, plums are packed with paper between the layers, and cherries and grapes loose in the boxes.

The total output of fruit from Placer County for 1891, in comparison with that of 1892, is presented below:

	1891—Pounds.	1892—Pounds.
Cherries	700,000	600,000
Peaches	11,000,000	13,000,000
Pears	3,500,000	3,700,000
Grapes	500,000	2,000,000
Apricots and nectarines	500,000	400,000
Apples and miscellaneous	1,510,669	1,600,000
Plums	1,000,000	1,200,000
Totals	18,710,669	22,500,000

The reduction in the output of the present season's crop is due to the general shortage in the State, caused by late rains and a light frost, which caught the orchards in full bloom.

The chief fruit sections of Placer and the fruits to which they are especially suited are as given below: Loomis, peaches, figs, and grapes; Penryn, peaches, pears, plums, and grapes; Newcastle, peaches, pears, plums, cherries, and grapes; Auburn, pears, grapes, and peaches; Colfax, pears and grapes.

ACREAGE AND VARIETY OF FRUITS IN PLACER COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	202	130	332	27
Apricot	94	186	280	43
Cherry	197	75	272	31
Fig	55	37	92	12
Olive	64	355	419	57
Peach	1,951	1,670	3,621	430
Nectarine	10	3	13	1
Prune	127	102	229	30
Pear	499	570	1,069	122
Plum	211	165	376	29
Lemon	....	5	5	3
Orange	53	220	273	54
Nuts—Almond	26	43	69	17
Walnut	7	15	22	....
Raisins	128	....	128	....
Table grapes	1,174	....	1,174	....
Small fruits	28	....	28	....
Totals	4,826	3,576	8,402	856

PLUMAS COUNTY.

Plumas is a mountain county, and much of what has been said in describing El Dorado, Alpine, and Placer Counties is applicable to Plumas. Mountain chains define its limits on several sides, its bounding counties being, on the north Shasta and Lassen, on the east Lassen, on the south Sierra and Butte, and on the west Butte and Tehama.

This county extends for a distance of 50 miles from north to south, and 75 miles from east to west, in the heart of the Sierra, having Lassen Peak, with an elevation of 10,577 feet (Whitney), on its northern border, and Pilot Peak, 7,605 feet, and Spanish Peak within its boundaries. Between the parallel ridges and spurs of the mountain range there are some picturesque and fertile valleys. The Feather River and its tributaries, with their deep cañons that have cut down in places to a depth of over 2,000 feet, afford drainage to the county into the Sacramento River. It has less plain land than the counties lying to the south; but, on the other hand, Plumas County differs from the counties lying to the south of it in contour, the surface being more of a rolling character. A great deal of rich valley land is thus placed at the disposal of the husbandman. There is virtually no limit to the fertility of the soil in those valleys, composed as it is of the alluvial deposits carried down by the melting snows and the rains of centuries from the overhanging Sierra. Still, much of Plumas is up among the mountains, lying in the midst of the Sierra Nevada range. Some of its scenery is among the wildest and most picturesque in the State, snow covering the summits of the mountains, their slopes being clothed with magnificent forests of pine, fir, and oak trees, and high ridges alternating with abrupt chasms and deep cañons, through which tumble running streams. There are grassy valleys of considerable extent throughout the county, which are cultivated by agriculturists, among them being Big Meadows, Mountain Meadows, Indian, Genesee, American, Beckwith, Butte, and Meadow Valleys. Big Meadow Valley, 15 miles long by 4 miles wide, is the largest of these mountain valleys, and is immediately adjacent to Mountain Meadows, of nearly the same size, and also to several smaller valleys, also cultivated, the whole constituting a plateau high up in the mountains, the elevation being 4,500 feet. Indian Valley, an important and prosperous district, is 11 miles in length by 2 miles in width, American Valley being the same size. Both connect with smaller valleys, and support several small towns, as well as the farms scattered over their extent. All these valleys are fertile, well watered and timbered, and contain an area of agricultural and grazing lands sufficient for the support of many thousands of people.

The greater part of Plumas County is located in the Sierra Nevada Mountains, and has the climate peculiar to that section. In the higher altitudes are long, cold winters, with heavy snowfalls and zero weather. In the valleys the winters are much less severe, being only moderately cold. The summers are perfect. Intense hot weather is unknown even in the lower valleys. The rainfall will average about 40 inches annually.

Where irrigation is needed Plumas has abundant water for the work. Mountain rills run down every cañon and ravine, and streams take their course through every valley. Two important branches of the Feather River rise in this county. The valleys are well watered, but generally treeless. Pure mountain springs and streams abound, and are found very desirable for dairying and general farming. Many of the valley ranches are irrigated from mountain streams. Round Valley reservoir covers about 1,000 acres, and supplies water for mines and for irrigating the lands of Indian Valley.

Many parts of Plumas County are especially adapted to deciduous fruits, and apples and pears do especially well there. Plums, prunes, nectarines, and peaches also do well in many localities, and where favorable conditions exist the trees are very prolific. A writer in the "Resources of California" says of the fruit of Plumas County:

"The berry and small fruit family is exceedingly prolific. Currants, gooseberries, blackberries, raspberries, and strawberries grow in great profusion and perfection; so much so, that tons of them annually go to waste for the want of an exterior market. A few square rods on the Huntington ranch, near Taylorsville, produced in one year the enormous quantity of 300 bushels of luscious strawberries, such as only the sheltered vales in the mountains can produce. These were sold at 16⅔ cents a quart; and had they all found sale, they would have returned the producer $1,600, the net income from which would be at least $1,200. On the Williams ranch, near Greenville, a similar result has been accomplished in berry culture. In the former case the ground was literally red with the juicy titbits, and perhaps more than half of them went to waste. But this exuberance of berry fruitage only illustrates what hundreds of similar places tributary to the mountain valleys can do, both in small fruits and the standard large fruits. In dells and vales lying at the base of mountain slopes facing to the south, from which slopes these sheltered places receive, by radiation at night, the heat absorbed during the day, all the common large fruits are produced in great abundance and of the most excellent flavor. Such places are the Boyle ranch in American Valley, the Martin ranch at Shoo Fly, and the Flournoy ranch in Genesee Valley, which produce, respectively, hundreds and thousands of boxes of the very choicest apples, pears, peaches, plums, prunes, nectarines, quinces, etc., yearly, at 2 to 3 cents a pound. The Flournoy place, from 220 trees, yields this year 2,500 boxes of apples, worth $1 a box in the orchard. These instances again only illustrate what can be done in many similarly covered mountain niches and gorges in the matter of fruit culture, although Plumas County is not considered a fruit county. We have mentioned this small industry of 2,000 trees, reported within the small territory traversed, to show the folly of the mossback and constitutional pessimists who are ready to depreciate the resources of the county. But the want of an exterior market keeps the possibilities of many of her industries in abeyance."

In Plumas County there are very few orchards of any extent, and no planting has been done for many years. This is essentially a mining county, and, with the decadence of the mining industry, what little was done in the way of orchard work has been practically discontinued. A few small family orchards are found in the county, but very little fruit is grown for market, and none at all for export. That grown, over the quantity used in family consumption, is sold in the local market and to miners.

The fruits that thrive there are apples chiefly, also pears, cherries, and, in some favored localities, peaches and plums. The localities where fruit is grown are the American Valley, Indian Valley, and Feather River at Rich Bar. At the last named point the finest fruit grown in the county is produced. Fruit has been grown in Plumas from a very early period, a number of small orchards having been planted during the early mining days of 1856 to 1860.

Plumas has no railroad communication with the outer world, and while the smaller fruits and berries and the hardier varieties of tree fruit would do well in most parts of the county, the lack of means of transportation renders fruit growing impracticable.

One of the principal orchards of the county is that of Robert Martin, at Shoo Fly. He has some 5 to 8 acres in apples, pears, peaches, plums, and cherries, the product of which he disposes of to the towns and mines in the vicinity.

The output of fruit in Plumas will be very light for the present season, apples and pears not averaging over half the usual crop, and other fruits falling below the usual average.

Irrigation is resorted to on a very small scale; a few farmers living on the mountain streams divert a little water to their land, but there is no systematic irrigating done.

The principal ditches of this county are used for mining purposes, and aggregate some 40 miles in length, with a valuation of $7,000. The irrigation ditches will aggregate 18 miles, with an assessed value of $1,450.

ACREAGE AND VARIETY OF FRUITS IN PLUMAS COUNTY.

Variety.	Acres in Trees.		
	Bearing.	Non-Bearing.	Total.
Apple	50	10	60
Cherry	2		2
Peach	3		3
Pear	16		16
Plum	4		4
Totals	75	10	85

SACRAMENTO COUNTY.

Sacramento County, one of the foremost counties of the State, and from a horticultural point of view *the* foremost county, is virtually the geographical and railroad center of the State, for while it is north of the middle line of the State, it lies directly in the center of the principal fruit and productive counties of California. It is bounded on the north by Placer and Sutter, on the east by El Dorado and Amador, on the south by San Joaquin, and on the west by Yolo and Solano Counties. Its area is 968 square miles, or 640,000 acres, all of which is practically arable.

The western boundary of the county for over 50 miles is the Sacramento River, the great navigable waterway of the State, and the southern boundary is the Mokelumne River. The American River traverses the county from east to west near the northern line, and the Cosumnes River crosses it from northeast to southwest. There is no mountain land in the county, most of it being almost flat or gently rolling valley land, with an altitude of from 30 to 75 feet above sea-level. In the extreme eastern portion of the county the rolling foothills of the Sierra Nevada commence, but the highest altitude in the county will not exceed several hundred feet.

The climate of Sacramento County is that of the better portions of California, which has made the State famous, and of which the ordinary Californian thinks little and speaks less. The figures here given of temperature, etc., are from the official records of the Signal Service, furnished by James A. Barwick, of Sacramento, Observer of the Weather Bureau and Director of the State Weather Service. The average rainfall is 20 inches, and there has never been a failure of crops in the county. Snow does not fall in Sacramento County, *i. e.*, she has had once in the past six years a fall of snow sufficient to measure, and which melted almost as soon as it fell. The thermometer rarely falls below freezing point—32° above zero. The past winter it has been below that point only six times, all in the month of December, the lowest being 27° above zero. Following is the record for December, 1891, and the first three months of 1892:

	Dec.	Jan.	Feb.	Mar.
Lowest reached	27.0	33.0	32.0	39.0
Highest reached	65.0	64.0	70.0	78.0
Mean for month	44.2	48.4	52.2	55.9

The mean temperature at Sacramento for years past is 60.5°. The mean temperature for March, 1892, as given by Signal Service Observer Barwick, was 55.9°. The highest and lowest temperature for the same month was 78° on the 7th, 9th, and 10th, and 37° on the 28th. The rainfall, 3.02 inches; clear days, 17; fair days, 8, and cloudy days, 6. The average temperature for March for forty years has been 54.9°. The summer months are warm, the highest reached last year being 104°. It is dry heat, however, bodily evaporation and radiation being free, and work is never stopped in the harvest fields or orchards. In ten years past there have been but nine nights when the thermometer went above 70°. She has an average in the year of 244 cloudless and 76 fair days. The first fruit blossoms have shown in Sacramento

County during the past twenty years as early as January 20th, and as late as February 29th. Last killing frosts in the same period have ranged from January 9th to April 6th.

The soil of Sacramento County may be divided into three general classes:

First—The river bottoms, a rich alluvial deposit, and of this soil there is a very large acreage along the various rivers of the county.

Second—A higher bottom, left by ancient waterways, the soil being a deep, sandy loam.

Third—The red soil of the plains and lower foothills.

All of these soils are particularly adapted to the best paying crops in fruit and produce. The lands close to transportation are all under cultivation, but by going into the southern and eastern portions of the county several hundred thousand acres can be found which are practically unoccupied, and may be bought at from $25 to $100 per acre.

Along the lower Sacramento River there are several large islands, bordered by sloughs and arms of the river, which contain some of the richest and most valuable soil in the world. Most of these islands have been effectually leveed and reclaimed, and in the coming years will become the garden spot of the coast. Grand Island, which is now thoroughly reclaimed, contains some 18,000 acres, every foot of which is capable of producing several crops per year of various kinds of vegetables. Some of the finest pear orchards in the State are on these river islands. The best lands are those which lie along the river banks. These are chiefly devoted to the growth of fruit and vegetables, and yield almost fabulous crops.

No other county in the State has such facilities for irrigating as Sacramento, though they have not been fully developed. She has an unlimited water supply in her various waterways, and land of gentle grade that is easily irrigated. Her bottom lands need no irrigation, save for garden truck, and for such use water is pumped out of the river if convenient. All over her plain land, surface water is found at from 4 to 30 feet, and raised by centrifugal pumps for irrigating purposes. The Folsom Water Power Company has already all surveys made for a system of canals and ditches covering about 300,000 acres of the best lands, the water to be taken out on both sides of the American River at the company's dam, above Folsom. The most perfect system of irrigation in the county, and one of the best in the State, is that of the Orange Vale Colony, which irrigates 3,200 acres of rolling orchard and vineyard land by means of water carried under pressure in underground steel pipes of from 26 inches to 4 inches in diameter. The water is distributed in furrows from the highest point of each 10-acre tract, the furrows being cultivated in the next day, so that there is no loss by evaporation and no menace to health from open ditches.

The following article on fruit production in Sacramento County is from the pen of P. E. Platt, President of the Sacramento City Board of Trade. He is a gentleman thoroughly conversant with the subject on which he writes:

"Sacramento County may properly be called the grand center or headquarters of the California green fruit business, so far as the Eastern shipments of this leading production of the State are concerned. The business commenced about twenty years ago at Sacramento in a small way, and has steadily increased until the fruit shipments from this point now constitute about the heaviest item of exportation from the State. As will be seen by a glance at the map, Sacramento is geographically located in almost the exact center of the State. Its position on the principal line of railroad makes it the natural point from which Eastern shipments originate. It is also a railroad center, and every leading fruit-growing district is directly tributary. All the leading fruit-shipping institutions in the country have their headquarters at Sacramento. It is not particularly the purpose of this article to point out the commercial advantages of this city, but incidentally these are worthy of note, and especially so in consideration of the fact that Sacramento combines with these commercial facilities the further advantage of being the center of a remarkably productive fruit section. It is of this latter feature that I propose to speak at this time.

"Sacramento County contains 620,000 acres of land, nearly every acre of which can be profitably cultivated. There are four distinct varieties of soil: First in value being the rich sediment soil of the river bottoms; next, a deep, sandy loam constituting what may be called a second bottom; third, a shallower soil of the plains; and fourth, the foothill land, which is of a gravelly nature, in many cases being formed of decomposed granite. These various descriptions are of course of different values, but each is peculiarly adapted to the production of some variety of fruit or vegetables. Land values in Sacramento County naturally vary from say $30 to $500 per acre for unimproved property. To some the latter price may seem high, and yet land at $500 per acre is frequently found to be a most profitable investment. It is truly surprising the amount of product that can be taken from a single acre of our best land. The writer has in mind an acre of cherry trees grown on the variety of land above described as second bottom, which last year produced a net income of nearly $1,500, while Bartlett pears have frequently produced from $600 to $800 per acre net to the producer in a single year.

"A list of the products or principal productions of Sacramento County would be a very long one. I think it is safe to say that there is no spot on earth where a greater variety of products can be grown, or where crops are surer than in Sacramento County. In this article I will only speak of a few of the leading kinds. It is possible for the fruit grower here to gather some kind of fruit every day in the year. During the winter months pomegranates, persimmons, oranges, lemons, and olives mature. The foothill district is especially adapted to the growth of oranges and olives. The most notable demonstration of this fact may be found in a colony near Folsom. Several thousand acres are being planted in this colony, which has been in course of development for three or four years past. In this connection it may be considered well worthy of note that oranges ripen in this part of the State much earlier than they do south, which I think may be accounted for by reason of its sheltered inland position, keeping it free from the influence of cold ocean trade winds during the ripening months of October and November. This fact of early ripening of oranges makes the industry vastly more profitable, as the fruit is ready for market before the holiday season, and long before the heavy Florida crop comes into competition. It has been a common thing for oranges grown in this section to sell at from $3 to $5 per box, and they have never sold below $3. I am told that orange growing is profitable at 50 cents per box.

These figures carry their own inference. It may be mentioned that the quality of citrus fruits produced here is not excelled in any section of the country; bright, solid, heavy, juicy fruit, of good flavor, is what the market demands, and all these essentials are found in Sacramento-grown oranges.

"Not all land in California, by any means, is adapted to growing oranges. On the contrary, it is only in favored spots, in any part of the State, that the best results can be had. The foothill districts of Sacramento, Placer, and Butte Counties show many such locations, and during the past four or five years a very large acreage has been planted to lemons and oranges.

"I next come to the consideration of what may be called spring fruits. These embrace strawberries, raspberries, blackberries, and cherries. Every acre of arable land in Sacramento County will grow the finest strawberries. It is a profitable crop when properly and intelligently handled. The only drawback seems to be that occasionally late rains during the months of April and May occur, and seem to injure the fruit when it is ripening. These occurrences are the exception, and not the rule. I think it is true that strawberries grown in Sacramento County are of better keeping quality than those grown anywhere else on the Pacific Coast. They are, when properly handled, easily transported to points as far east as the Missouri River, and there is an unlimited demand for them up to the time when the same fruit matures in the East. This generally gives the entire months of April and May for a clear market to the Sacramento producer.

"Raspberries and blackberries are not grown so extensively as they might be. The former is a very profitable crop; the latter not so much so. Cherries should be planted much more extensively than they are; still it is true that there are a good many large orchards in this county, and I think it is also true that they are universally very profitable. The writer is interested in an orchard of cherries located just east of the city of Sacramento, from which twenty boxes per tree have been picked, and sold at an average of over $1 per box, the trees being only six years old. Cherry culture should be one of the most lucrative callings any one could follow. The fruit ripens here during the latter part of April and early May, and is of such quality that with the recently improved transportation facilities, it can be delivered in New York or any other Eastern city in prime condition, and long before similar fruit can be had from any other section in the country. Following the early spring fruits, other varieties come in rapid succession, such as apples, apricots, peaches, plums, nectarines, pears, and grapes. These of course are divided into a large number of varieties, but I think the Sacramento fruit grower has demonstrated the fact by much experimenting in the past, that more money can be made from a limited number of varieties than by producing a great many kinds. In apples, the Red Astrachan, Early Alexander, and White Astrachan have been found to be most profitable. I think all these mature in Sacramento County earlier than they do in any other part of the State, and consequently earlier than they do in any other fruit-producing section of the United States; the result is that they can be marketed to advantage in all parts of the country, especially at points this side of the Mississippi River. It would not, however, seem to be advisable to plant late varieties of apples here, as they do much better in the foothill and mountain districts. The apricot is not a favorite fruit for the table in the East, except in a preserved form. Still, a limited quantity of them find their way East to advantage; but dried and canned they have always been profitable. The usual varieties are grown and are remarkably prolific, especially on the Sacramento and American Rivers. I venture the opinion that this fruit will grow in favor.

"A trip through the peach orchards of this county during the months of May, June, and July would open the eyes of any one not familiar with what can be done in this favored section. The foothill peaches are the finest in appearance and flavor; but I think the peach grower finds more profit in the deep sediment lands of the river bottoms, by reason of the greater productiveness. I have never known a failure of the peach crop in this county, and have never seen the time when growers could not dispose of their crop to good advantage.

"Plums and prunes are next in importance. Both of these grow to great perfection. I think the largest and finest prunes I ever saw were grown on the American River. Many years ago, Hon. Joseph Routier, one of California's best horticulturists, drew attention to what could be done in the culture of the prune. Many others have followed his example, and yet there is room for great development in this line, especially along the line of the American River, where a large tract of land is adapted to it.

"The best authorities are now agreed that the California Petite prune must soon drive out the imported article, and then our State will enjoy the entire trade of the United States. It has certainly been sufficiently profitable up to this time, and no fear of overproduction need be entertained. American River prunes have always sold at from 6 to 10 cents per pound. I am told that the product would be profitable at 3½ cents.

"A great many varieties of plums are grown, among them being the celebrated Tragedy prune, the earliest grown in America of a large size. These originated in Sacramento County. They are shipped East every year, and realize fabulous prices. A good many have been planted out during the past year or two, and naturally when production is largely increased prices will diminish, but I think they will always be profitable. Shipments of plums continue during the months of June and July on a very heavy scale.

"If Sacramento is celebrated in horticultural circles for one fruit more than any other, it is best known on account of its Bartlett pears. They mature very early, the first shipments being made about the 20th of June. The quality of the Sacramento Bartlett is known all over the United States. The county has not, in my opinion, been properly accredited with this production. I think that every box of Bartlett pears leaving Sacramento County should, in justice, be labeled with the name of the county, on the principle that credit should be given where credit is due. This would be only just and proper. These pears have been shipped in great quantities from Sacramento City to every market of any size in the United States, and are as well known in New York, Boston, Chicago, New Orleans, Minneapolis, and St. Louis, as in San Francisco. It embraces all the fine qualities that can be found in any pear grown in the world. It grows on the rich lands of the Sacramento and American Rivers in larger quantities and better sizes than anywhere else in the world, I think. It has always been one of the most profitable productions of our section. The crop never fails. It is easily cared for, gives employment to a great many people, and whether dried, canned, or consumed in a green state, is a most delicious luxury. They can be profitably grown at 50 cents per box, but have always been sold at nearly double that price.

"Sacramento County, I think, produces the finest grapes that are found in California. It is true that the highest prices ever paid for California grapes in the New York market have been paid to Hon. R. D. Stephens, whose vineyard is located on the American River, 10 or 12 miles east of the city of Sacramento. The prices realized by Mr. Stephens have been marvelous, and yet there are plenty of other vineyards that would doubtless pay as well if the same care and close selection were given in packing them for Eastern shipment. Mr. Stephens realizes a small fortune every year from 20 acres planted to the celebrated Tokay and Cornichon grapes. Among other varieties grown here are the Muscat, Black Prince, Morocco, and Emperor. Grapes of all kinds do remarkably well on the plain lands, the most wonderful instance of this kind being found at Florin. The vines are irrigated very easily and cheaply by means of windmills lifting the water, which is found in abundance at a depth of about 10 feet. At Natoma, in Sacramento County, may be found the largest vineyard of table grapes in the State. They are mostly of the Tokay variety, and always bring fancy prices in the East.

"Among other productions the fig is commencing to play an important part in the crops of Sacramento County. On the banks of the rivers this tree attains a great size and is remarkably productive. The common black fig requires absolutely no care or attention. The fig grows like the oak, and is equally vigorous, and when covered with its large green leaves and rich, handsome fruit is a very beautiful sight. The first crop is usually sold green, but the second is allowed to fall to the ground, and when sufficiently dried the figs are thrown into sacks and readily command from 3 to 5 cents per pound. The better varieties of the fig of commerce are now being introduced, and will doubtless soon take the place completely of the common black fig.

"Almonds do remarkably well and are very profitable. Among other products of this county are hops. According to one of the leading hop growers of the State, and a recognized authority, Daniel Flint, Sacramento County is unsurpassed for hop culture. He says that a crop of from 1,000 to 2,000 pounds per acre may be had the first year that roots or sets are planted, and it is a common thing to grow 2,000 or 3,000, and sometimes 4,000 pounds per acre from well-developed vines.

"The vegetable business is also a leading feature among the industries of this county. Hundreds of carloads are shipped every year of cabbage, onions, and potatoes. I think the growing of these crops can be very greatly increased with great profit to the growers. Beans of various kinds are very profitable on the Sacramento River lands, and are grown in very large quantities.

"I think the opportunities for successful investment of large sums of money are unexcelled in Sacramento County. Plenty of land can be found that is adapted to the successful culture of all the above-named fruits and vegetables; and better than all else, there is a first-class market for it when grown.

"Fifteen years ago it cost $1,200 to get a carload of fruit through to New York in ten days' time. Since then every year the railroads have improved to some extent the service on Eastern shipments. It is a fashionable thing to assail the railroad companies and to blame them for all that may appear to be wrong in the business of handling fruit, but I think it is only fair and in justice to the Southern Pacific Railroad Company to say that its managers have always shown great interest in the fruit transportation question.

"As above stated, there has been some improvement either in rates or train service made every year, and for the present season we are promised a daily fruit-train service from Sacramento City to all Eastern cities, to be run at freight-train rates, and on a schedule time equal to what was formerly the passenger-train time. In other words, the service that originally cost us $1,200 per car will now be performed by the railroads for $300 per car. We will thus be enabled to deliver fruit in New York City in eight days from the time it leaves Sacramento, and at a cost of 1½ cents per pound for freight charges. If the Southern Pacific Company, which has made splendid time to Ogden, can arrange, as I understand they are now trying to do, with the Eastern connecting lines, this favorable rate and time will be made and with the result of incalculable benefit to Sacramento County."

Sacramento's chief fruit products are in the line of peaches, prunes, plums, cherries, apricots, and berries. These are shipped chiefly to Eastern cities, San Francisco, and the canneries. About one half of the total output goes to the East. The larger part of this is marketed green, except such as is canned by the two canneries at Sacramento City. Fruit is sold to the canneries at Sacramento, Chips Island, San Francisco, and San José. For shipment to the East it is packed in standard shipping boxes and crates. To be sent to the canneries, it is packed in large boxes known as tomato boxes, with covers, each holding about 60 pounds. Peaches are sent in baskets holding from 22 to 25 pounds and in boxes of 20 pounds. Prunes for the San Francisco market are packed as peaches for the East are shipped, in crates of 20 pounds each.

The following is the output of fruit in Sacramento County for 1891:

	1891—lbs.
Apples	1,657,500
Apricots	3,755,000
Cherries	670,000
Figs	103,000
Peaches	28,931,000
Pears	26,328,000
Prunes	1,112,500
Quinces	122,500
Table grapes	20,420,000
Miscellaneous fruits	4,815,000
Total	87,912,500

The following are the prices paid last season and this for leading green fruits in Sacramento:

	1891.	1892.
Tragedy prunes, per crate	$1 75	$1 25
Pears, per 40-lb. box	75c. to $1 00	1 25
Peaches, delivered, per pound	02	02¼

The area of fruit in Sacramento County is some 12,000 acres, of which 700 acres were planted during the season of 1891.

The larger part of the orchards, together with the new plantings, are along the Sacramento and American Rivers. The soil there is a deep alluvium, next to the river a deep, sandy loam, which becomes more shallow as it extends back from the river. This is underlaid by a hardpan from 1 to 2 feet in thickness; still farther back, the soil becomes a decayed vegetable mold, almost a peat, commonly known as "tule lands." This is very valuable for vegetables and the smaller fruits, when drained by levees and drainage pumps.

The Natoma Water Company have ditches for irrigation in the vicinity of Folsom and Natoma; above Sacramento the irrigation is mostly from wells. On the Sacramento River no irrigation is required. The lands generally are very damp and must be secured by levees from the high water of the Sacramento River. The ground being highest near the Sacramento, ditches are dug to conduct the seepage water eastward, and immense pumping engines throw the water over the Cosumnes levee. One pump in the Pearson district has a capacity of 130,000 gallons per minute, but the full capacity is seldom needed. These pumps are run from six to twenty-six weeks during the year, usually from seven to eight weeks. The action of the pumps can be reversed for irrigation, throwing back, if needed.

ACREAGE AND VARIETY OF FRUITS IN SACRAMENTO COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	29	10	39	3
Apricot	436	99	535	38
Cherry	123	37	160	5
Fig	38	96	134	40
Olive	87	30	117	13
Peach	1,970	900	2,870	267
Prune	680	403	1,083	63
Pear	1,942	650	2,592	183
Plum	650	37	687	12
Lemon	3	8	11	4
Orange	125	70	195	22
Nuts—Almond	126	132	258	43
Walnut	26	18	44	7
Raisins	400		400	
Table grapes	2,550		2,550	
Small fruits	870		870	
Totals	10,055	2,490	12,545	700

SAN BENITO COUNTY.

San Benito County lies 25 miles inland, and to the east of the town of Monterey; bounded on the north by Santa Clara County, on the east by Merced and Fresno, and on the south and west by Monterey County. It is about 70 miles in length, averages about 21 miles in width, and embraces an area of 1,056 square miles, or 676,000 acres. This county is inclosed on two sides by mountains—on the east by the Mount Diablo range, and on the west by the Gabilan Mountains. From these ranges the surface slopes to the valley of the San Benito River, which flows northwesterly through the middle of the county, and empties into the Pajaro River. A few small streams, the most important of which is Tres Pinos Creek, are tributary to the San Benito. A very large part of the area of San Benito is classed as mountain, but there are numbers of little valleys and much level land in the county.

The soil of San Benito may properly be divided into four classes, as follows:

First—About 25,000 acres of rich garden land. The soil is of a black sandy loam, and will produce in abundance any kind of vegetation, and is excellent for fruit. Upon this fertile land are raised the fine vegetables which supply local demands, and largely the markets of San Francisco.

Second—About 34,300 acres of first-class grain land, contained principally in what is known as San Benito Valley (the extreme southern portion of Santa Clara Valley). The soil is a black sandy loam, or adobe, with a blue or sandy subsoil, and holds moisture well. It is principally from this land that the large amount of grain usually shipped from this county is raised.

Third—About 46,000 acres of what is termed second-class grain land, situated in the foothills, and composed about equally of adobe and sandy soil. This land is not so strong as the valley land, but produces quite fairly, and in dry seasons is more sure of good crops than the richer bottom land. From this land is cut very fine hay, noted in San Francisco markets as "Hollister hay."

Fourth—In addition to 105,300 acres capable of producing vegetables and grain, there is a large amount of hill land which makes very fine pasture. More or less of it is connected with many of the ranches in the valley.

The largest single body of valley land lies in the northern part of the county, and forms the *southern* end of the Santa Clara Valley. Numerous valleys of smaller extent add their quota to the area of first-class land. Among these may be named the San Juan, Santa Ana, Quien Sabe, Los Muertos, Bear, Panoche, and Bitter Water Valleys.

San Benito County, situated midway between the San Joaquin Valley and the coast, has a climate tempered by both, avoiding the extreme heat of the former and the chilling winds of the latter. It is separated from the coast by the Gabilan range, but is yet near enough to the ocean to feel its tempering influence. Fogs are not of frequent occurrence, and during the summer months the ocean breeze finds its way every day through a mountain gap, rendering the climate very healthful and pleasant. The average temperature at Hollister, as given by the United States Signal Service, shows 59.5° for the year, the highest being 109° and the lowest 21°. Vegetables grow the year round, and the nights are always cool. The average precipitation is nearly 12 inches annually, which, it may be said, all falls between November and April. An average record for a series of years, kept at Hollister, shows the average by months as follows:

	Inches.		Inches.
January	2.62	July	0.00
February	1.96	August	0.00
March	1.93	September	0.08
April	1.20	October	0.65
May	0.40	November	1.30
June	0.22	December	1.42

These figures give the rainfall in the valley, but in the mountains they are greatly increased.

The rivers and streams that flow from the mountains bordering the county, together with numerous springs, furnish an abundant supply of water. No irrigating canals have been constructed, because they have not been found necessary; the generous rains of the winter and spring months give to the ground all the moisture needed. San Benito's topography is such that if any system were adopted for husbanding the water which runs off in the San Benito River and the Tres Pinos Creek a great portion of the valley lands could be irrigated at a small expense. There is a large area of the county in which artesian water is obtainable. In the San Felipe district alone there are a large number of artesian wells constantly flowing.

San Benito has been principally devoted to farming and stock raising, but of late years a great deal of attention has been given to horticulture, and with the most encouraging results. Large areas of land have been planted to fruit in the country around and tributary to Hollister. Apricots do especially well there, and in one orchard near San Juan there are 160 acres of fruit, including 2,600 apricots, 750 peaches, 1,400 pears, 300 cherries, 1,500 apples, 700 silver prunes, 150 figs, 2,600 prunes, 500 plums, 500 almonds, 250 chestnuts, 300 walnuts, 2,000 olives, and 15,000 grapevines. This orchard is now six years old and is paying handsome returns on the investment.

Of the fruit generally grown about Hollister, the principal varieties are: Apricots, prunes, pears, grapes, apples, cherries, walnuts, almonds, quince, strawberries, and blackberries. The leading varieties of each of these grown there are:

Apples: Green's Newtown Pippin, Gloria Mundi, Yellow Newtown Pippin, Rambo, Rhode Island Greening, Hubbardston's Nonesuch, Baldwin, Swaar, Russet, Winesap, Limber Twig, Twenty-ounce Pippin, Fall Pippin, Northern Spy, Smith's Cider, Yellow Bellflower, E. Spitzenberg, Roxbury Russet, Grindstone, Virginia Greening.

Peaches: Wager, Smock, Heath Cling, Orange Cling, Grove's White Cling, Old Mixon Free, Late Crawford, Snow, Salway, Lemon Cling, Grove's Red Cling, Briggs' Red May, Alexander.

Pears: Bartlett, Winter Nelis, Seckel, Flemish Beauty, P. Barry, Le Conte, Beurré Hardy, Easter Buerré, Keiffer's Hybrid.

Table Grapes: Black Hamburg, Flame Tokay, Muscat of Alexandria, Rose of Peru, Purple Damascus, Verdel, Red Chasselas, Muscatel, Sweetwater, Isabella.

Cherries: Governor Wood, Black Tartarian, Cleveland Bigarreau, Napoleon Bigarreau, Black Republican, May Duke, Early Purple.

Plums: Coe's Golden Drop, Imperial Gage, Green Gage, Yellow Egg, Jefferson, Washington, Bradshaw, Smith's Orleans, Kelsey Japan, Blue Damson.

Prunes: French, German, Fellenberg, Hungarian, Silver.

Figs: Smyrna, Black California, and White Ischia.

The chief fruit sections of San Benito County are, in order of importance, San Juan Valley, San Felipe Valley, Hollister, Bitter Water Valley, Priest Valley, and Gilroy. While little has as yet been done in the way of fruit growing on a large scale, there have been several large orchards planted during the past two years, and these are making a very thrifty growth, and enough has been done to show that when San

Benito enters the field as a horticultural county, she can produce a very wide range of very excellent fruits.

There are no shipments of fruit from this county, all that is produced being used for local consumption.

One of the oldest orchards in the State is found in San Benito, being the Old Mission orchard at San Juan. This was planted as early as 1785, and comprised pears, apples, olives, and grapes. Although it has been neglected and fallen largely into decay, there are still a number of the original trees standing; these are pears and olives, scattered about in promiscuous disorder.

After the Missions, the pioneer orchardist of San Benito was Theophile Vecchi, who planted a small orchard on the Gabilan range, with stock imported from France, in 1854. Among other pioneer orchardists of the county are Captain Buck, of San Felipe; Senator Flint, of San Juan; Marion Crow, of Hollister; William Palmtag, of Hollister, and W. H. Stone, of Piacines.

ACREAGE AND VARIETY OF FRUITS IN SAN BENITO COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	87	23	110	5
Apricot	181	47	228	12
Cherry	28	12	40	8
Fig	28	9	37	4
Olive	21	17	38	6
Peach	124	83	207	
Prune	427	275	702	63
Pear	104	58	162	17
Plum	9	7	16	2
Lemon	1		1	
Orange	1	2	3	1
Nuts—Almond	56	20	76	7
Walnut	35	9	44	3
Raisins	17		17	
Table grapes	12		12	
Small fruits	20		20	
Totals	1,151	562	1,713	128

SAN BERNARDINO COUNTY.

San Bernardino is the largest county in the State, comprising within its area 23,476 square miles, or 14,200,000 acres. It is bounded on the north by the State of Nevada and Inyo County, on the east by Arizona, on the south by San Diego, and on the west by Orange, Los Angeles, and Kern Counties. The greater part of this vast area is desert, the only arable land of consequence lying in the southwest corner of the county, surrounded by the Sierra Madre and San Bernardino Mountains on the north and east. These mountains are a continuation of the Sierra Nevada range, and at the San Gorgonio Pass meet the San Jacinto range, which, with the Santa Ana range, skirt the southern portion of the valley, leaving a perfect amphitheater, which opens on its west side toward the ocean. Within this valley are a number of buttes, some of which rise abruptly out of the plains.

Topographically viewed, this county may be considered an elevated plateau or plain, occupied or traversed by numerous mountains, some of which stand in irregular groups or isolated masses, while others stretch out into long ranges, flanked by foothills, and having a generally north and south trend. This plain, from an elevation of less than 1,000 feet on the south, rises in the central and northern parts of the county to a height of 4,000 feet or more.

Scattered about between these higher mountains occur many volcanic cones, buttes, and clusters of broken hills, not more than two thirds of the entire area of the county consisting of level or nearly level ground. Foremost among these isolated masses is the rugged elevation known as Mount San Bernardino, which, standing in the southwestern angle of the county, lifts itself to a height of 11,600 feet above the level of the sea. It is precipitous on all sides, its declivities being rocky, and nearly everywhere difficult of ascent. For more than half the year the higher portions of this mountain are covered with snow, which melting, keeps the larger streams, having their source in it, well replenished until late in the summer, the most of them flowing the year round.

It is to this abundant supply of water, now all appropriated for irrigating purposes, that the country adjacent on the south and west is indebted for its unbounded fertility. From the forests on this mountain, the local demands for fuel and lumber are in good part met, the body of timber standing there being the largest and best found in the southern part of the State. Measured through its base in any direction, Mount San Bernardino extends fully 30 miles. One of the peaks of this mountain, though not the highest, constitutes the initial point of the public land surveys for Southern California; the base-line and meridian passing through it. This peak is very much lower than the extreme summit of the mountain, known as "Grayback," the crest of which extends 3 or 4 miles in an easterly and westerly direction.

A long, straggling chain of mountains, stretching southeast from the central San Bernardino group, having by some topographers been considered a continuation of this mountain, has so been designated on their maps, though to different portions of this chain local names have been given. Southeast of San Bernardino some 20 miles, and separated from it by San Gorgonio Pass, stands the San Jacinto Peak, its base extending over into San Diego County. Its top is only about 500 feet lower than that of the opposing mountain, which in many respects it closely resembles. Running out from this peak a high ridge extends far to the southeast, this ridge retaining the name of its culminating summit. San Jacinto, being so high and so nearly isolated, can be seen for more than 100 miles off on the Colorado Desert.

The San Gabriel Mountains, a high and nearly timberless range, extends from Mount San Bernardino, with which they are connected by an elevated ridge, 50 miles northwest; the point of lowest depression in this ridge being known as the Cajon Pass. Covered almost wholly with chaparral, and cut by deep cañons, these mountains present a gloomy and forbidding appearance. They are dry and barren, nor do they contain any more than a limited area of agricultural land. The dominating summit of these mountains is San Antonio Peak, 9,630 feet high, which stands near the line between this and Los Angeles County, in which the greater portion of this range is situated. This peak is a conspicuous object viewed from the north or the east, being visible a long way off in these directions.

The other mountains in this county stand off in the Mohave Desert; the Providence range, on its eastern border, being the highest and in other respects the most notable. This range extends north-northeast and south-southwest for a distance of about 80 miles, several partially disjointed mountain masses being included, and to some of which distinct names have been given, though the whole properly constitutes but one chain. In its culminating peak on the south, sometimes called Mount Edgar, this range reaches an elevation of 6,350 feet, many portions of it elsewhere being nearly as high.

A large portion of the Mohave and Colorado Deserts are found in this county, and reach from the base of the mountain ranges on the north and east to the Colorado River. No fruit of any kind or other vegetable products of use to man grow on these sterile plains.

The water supply of the valley is ample for all purposes. From every cañon in the range creeks and rivers find their way to the plains below. Like the streams in most mountain countries, many of them are dry beds in the summer and roaring torrents in the winter months. Many of them, however, are perennial, and these furnish the great supply for the irrigating system which has made San Bernardino County famous. Chief among these streams are the Santa Ana River, and Mill, San Timoteo, Temescal, City, Twin, Devil's Cañon, Cajon Pass, Lytle, Warm, Cucamonga, San Antonio, Rincon, and Chino Creeks, all on the southeast side of the range, and the Mohave River on the north. The latter river has its rise on the eastern slope of Mount San Bernardino and is finally lost in the Mohave Desert.

The soil of San Bernardino Valley, the only portion of interest from a horticultural point of view, varies greatly with location. At Highland it is a sharp gravel, with a large admixture of alluvium. It is easily worked and under water very fertile. At Redlands the soil, as the name implies, is red, characteristic of the foothill regions of the State. It is very largely composed of clay with an admixture of sand, and on the higher portions very gravelly. It is heavily impregnated with iron and potash, and rich in the constituents of plant-life. At Old San Bernardino the soil changes to a heavy black loam with streaks of adobe, and from there to the Santa Ana River are large alkali flats, the surface of which in many places presents the appearance of a snow-covered field. Riverside soil is generally a heavy clay, in some parts mixed with sand, getting gravelly toward East and South Riverside. Rialto has a sandy and gravelly loam, and Cucamonga is generally a very light sandy soil. Around the city of San Bernardino the land is generally strong adobe heavily impregnated with alkali. So heavily charged with alkali is a large portion of the land there that fruit growing has had to be abandoned, and along the line of the Arrowhead Railroad are seen large tracts where the experiment has proven costly to their owners, and the dead trees stand a dismal monument to their failure. Ontario has a sharp, gravelly loam, warm and fertile, and in the Terrace at Colton is found a rich deep loam in which fruit does exceptionally well. Along the river bottoms a cold, damp clay, not so good for fruit or for farm purposes, is found.

The climate of San Bernardino differs as widely as her soil and topographical features. In the northern plateau winters possessing almost the rigor of those of the East prevail. Heavy snows are not uncommon in the winter season, and severe frosts are frequent. South of the mountain ranges a different climate prevails. At Highland frost is a thing almost unheard of; Redlands suffers little; Ontario, Riverside, and Colton are more subject to visitations, though not usually severe enough to do great damage; while the city of San Bernardino, lying in a low, damp situation, suffers more than most other sections of the county. The most disagreeable and costly feature of the climate here is the "northers," which prevail to a great extent through the winter months and do great damage. Wherever orchards are planted it is found necessary to protect them from these destructive winds with wind-breaks of evergreens, and even with this protection orchards are sometimes very roughly treated.

The spring months are characterized by considerable foggy weather, not usually dense, and occasional hot days. The summer is hot. Sixty miles east from Los Angeles it is several degrees hotter, the thermometer frequently recording 104° to 110°. This heat, however, is modified by an ocean breeze which blows from two o'clock until sunset.

Rainfall in the different parts of the county varies with the topography. At Riverside the average annual precipitation will not exceed 8 inches; at Redlands much more; at San Bernardino, about 12 inches, and this amount increases as the mountains are approached. At Bear Valley there is rarely ever a less fall than 30 inches, and sometimes as much as 100 inches will fall in a season. On the desert the precipitation is very light; in some portions there is barely any rainfall. The rainfall for the season of 1891–92 at San Bernardino was:

	Inches.		Inches.
August	.91	May 1	.17
September	.93	May 3	.26
December	3.48	May 4	.79
January	3.67	May 5	.07
February	4.56	May 30	.06
March	1.72		
April	.23	Total	16.85

For the number and perfection of her irrigation enterprises, San Bernardino takes front rank among the counties of California. It may be called the mother of irrigation, for there are found some of the oldest works in the State. Some of these were even constructed by the Mission fathers before American occupancy. Upon the purchase of the Rancho San Bernardino, in 1853, by the Mormons, a complete though somewhat primitive system of irrigation was at once developed. From that time until the present the system has grown, until to-day the whole arable portion of the county is a network of irrigation canals and service ditches. The first great irrigating work was the construction of the Riverside Canal in 1870, which took water from the Santa Ana River at the base of Slover Mountain, and delivered it through the Riverside District, a distance of 11 miles. The success of this work gave an impetus to others, and the North and South Fork Ditches of the Santa Ana were extended and enlarged. Afterwards the great Bear Valley Reservoir was constructed, and this was followed by the Gage water system. Most of the canals are cemented, or the water is carried in pipes to the land upon which it is to be used. The larger part of the Bear Valley water is piped. Redlands, Alessandro, and Perris are all under this system, and the water supply to all of these places is piped. Besides the numerous private canals there are five districts in San Bernardino County organized under the Wright Act.

These are Alessandro, Citrus Belt, East Riverside, Grapeland, and Rialto.

The following table shows the development of water in this county during the past ten years. The figures show the acreage capacity of the principal irrigating systems of the county:

Water Systems.	1880.	1890.
Riverside	5,000	10,000
Gage Canal	--------	15,000
South Riverside	--------	6,000
Ontario	--------	5,000
Etiwanda	--------	3,200
Cucamonga	2,000	10,000
Lytle Creek	500	10,000
North Fork Ditch	1,000	4,000
South Fork Ditch	1,000	4,000
Mill Creek	3,000	5,000
North Riverside Canal	--------	7,500
Vivienda Pipe-line	--------	5,000
Rincon Ditch	3,000	4,000
Chino Pipe-line	--------	3,500
City Creek	--------	500
Twin Creeks	500	3,000
Banning	--------	3,000
Colton Terrace	--------	2,000
Bear Valley Reservoir	--------	28,000
Totals	16,000	128,700

The canals, reservoirs, and waterways of San Bernardino are all for irrigating purposes. There are a few mining ditches, but they are small, and are not assessed separately from the property to which they belong.

IRRIGATION WORKS IN SAN BERNARDINO COUNTY.

Name.	Miles.	Total Value.
Riverside—Warm Creek Canal	$4\frac{7}{10}$	$24,455
Riverside—Upper Canal	14	76,080
Riverside—Lower Canal	15	60,985
Gage Canal	12	54,000
Domestic Water Company	10	50,000
Hesperia Canal	6	12,000
Lugonia Water Company	10	50,000
Rabel Dam Ditch	2	9,240
Bear Valley	5¼	10,250
Gage Pipe-line	4½	3,955
Riverside Pipe-line	$37\frac{2}{10}$	25,555
Bear Valley Pipe-line	14	33,000
North Fork Ditch	8	50,250
Bear Valley Extension Ditch	5	5,000
Green Spot Pipe-line	4	4,500
Alessandro Pipe-line	10	25,000
Riverside Pipe-line	13	29,990
Ontario and Etiwanda Pipe-lines	14	31,655
J. F. Houghton's Ditch	9	3,500
Cram & Van Leuven Ditch	7	21,100
Mill Creek Zanja	10	50,000
Meeks & Daley Ditch	1	3,500
Yorba Ditch	7¾	31,000
Jurupa Land and Water Company	4	12,000
Rancheria Ditch	3	5,000
Lytle Creek Water Company	7	20,000
Moreno Pipe-line	6	5,400
Rincon Ditch	4	13,000
Totals	$247\frac{1}{10}$	$720,415

Within the year last past upwards of $750,000 have been expended in developing the various irrigation systems, and upwards of 150 miles of cement ditches, and vitrified, iron, and cement pipe-lines have been laid for the purpose of distributing water. Moreno, Alessandro, Riverside, Rialto, and South Riverside have been the principal points of activity in this direction. Not only has a great amount of money been expended in distributing water, but large sums have been expended in building storage reservoirs, principally by the Bear Valley Company and the Arrowhead Reservoir Company. The Bear Valley Company has begun work on its new dam which, when completed, will form a lake of water over 6,000 feet above the sea, about 12 miles in length, and with a capacity sufficient to irrigate 100,000 acres of land. In addition to this site several others have been located by the company, which will, when completed, increase the volume of water flowing through their irrigation system to an amount sufficient to water all the dry lands within reasonable distance. The Arrowhead Reservoir Company is preparing to build four dams, forming lakes of water sufficient to irrigate all the land from San Bernardino to Ontario, a plain 20 miles in length and 10 miles wide. A large force of men has been in their employ all summer building roads to the mountains, and several parties of engineers have been busy in surveying the reservoir sites and lines for the distributing canals, and there is every reason to believe that this company will be able to deliver water early in 1893 upon the dry plains.

San Bernardino produces most of the deciduous fruits. Apples and pears do well in the mountain region. Cherries and many of the small fruits are not found profitable. Prunes do well, and much attention has been paid to them of late years. Peaches and apricots also do well. The great industry of San Bernardino, however, is the growth of citrus fruits, and more oranges are exported from there than from any other one county in the United States. It was known that oranges would do well in this county early in the sixties, and several trees were bearing at Old San Bernardino at that time. They were regarded as a curiosity, however, and no attention was paid to citrus culture as an industry until Riverside took up the work in 1870. It was there that citrus culture had its start, and that amid untold opposition on the part of the older settlers. who regarded the Riversiders as visionaries, impractical dreamers, who would certainly fail. But Riverside made a success, and from her as a center, the citrus industry has spread until it now covers every available part of San Bernardino Valley, and has become an important factor, not alone in the history of Southern California, but of the whole State.

The chief sections of San Bernardino are, in order of importance, Riverside, Redlands, Ontario, Highland, Colton, South Riverside, Old San Bernardino, Rialto, and the country surrounding the town of San Bernardino.

The principal fruits produced are those of the citrus family, San Bernardino having attained a reputation over the entire Union for the superiority of her oranges. It is estimated that one half of the orange shipments from California are taken from San Bernardino County. Riverside supplying by far the greater part of these.

The shipments of oranges and lemons from Riverside for the season of 1891-92 foots up a total of 402,030 boxes, or 1,406 carloads. The larger part of these were shipped over the Atchison, Topeka, and Santa Fe Railroad, and found a market in Chicago, St. Louis, and New York.

A heavy wind storm which swept over the whole of Southern California on the 10th of November, 1891, through the San Gabriel Valley, and over the Riverside Plains, caused considerable loss in the orange crop of this section. This was not so severely felt at Riverside as it was in the San Gabriel Valley, but was followed by a severe frost on Christmas night, which injured the Riverside crop to a greater extent than it did that of the San Gabriel Valley. The result of these two climatic afflictions was to very largely reduce the output of oranges and lemons in this district, a very large portion of the Riverside crop being a total loss. In consequence, the shipments from this district were very much lighter than in the preceding year.

The shipments of the season of 1890-91 from Riverside were 1,446 carloads, showing a falling off in 1891-92 of 6 per cent, despite the fact that numerous young orchards came into bearing that year. The prospects at the present time are for a very largely increased output during the coming winter. The trees are all heavily laden, and a very large number of new orchards are coming into bearing over the whole district, and from present appearances, the shipments of the coming winter will be increased nearly 25 per cent over those of the past season.

The extent of damage done by the heavy wind storm and severe frost of last season, is shown from the fact that the export of oranges for 1890-91 from Southern California was 4,593 carloads, and the total export for the season of 1891-92 was reduced to 2,809 carloads. The inferior quality of much of the fruit this season had a demoralizing effect upon the market, and, in consequence, much of the better fruit was sold at very low prices.

The following statement will show the export of oranges from Riverside for the past ten years:

	Carloads.		Carloads.
1880-81	15	1887-88	725
1881-82	42	1888-89	982
1882-83	45	1889-90	1,500
1883-84	50	1890-91	1,446
1884-85	456	1891-92	1,406
1885-86	506		
1886-87	375	Total	7,548

Ontario, though much younger than Riverside in the citrus industry, is already making a very considerable mark in that line. There is a very large extent of excellent citrus land in the vicinity of Ontario. The orchards are well kept and the industry is a very promising one. Large shipments have been made from this section.

The orchards in this district are young, the acreage and bearing being comparatively small. The first shipments of fruit in carload lots were made in 1890.

Several very extensive companies have been organized for the cultivation of citrus fruits at Alessandro, Redlands, North San Bernardino, and other points. One of these, the "Mount Vernon Orange Grove and Fruit Company," organized May 9, 1891, with a capital stock of $375,000, was projected for the purpose of planting a large area of land north of the town of San Bernardino. Seventy-five acres were planted in 1891 to budded orange trees. It was the intention of the company to plant 200 acres last spring, but owing to the severe weather of last winter, they were prevented from doing as extensive work on this project as was originally designed. It is probable that it will be carried out during the coming season.

Very extensive planting has been done at Alessandro, Marino, Rialto, Cucamonga, Etiwanda, East Riverside, South Riverside, and in the vicinity of Redlands, Crafton, and Old San Bernardino. These orchards, when they come into bearing, will very largely increase the output of citrus fruits from this section.

Chino is another new district. Comparatively little attention has been paid to fruit in this district, the beet sugar industry overshadowing all others. There has, however, been a healthy growth in the orchard industry, and a large number of trees have been planted. The plant of new trees in this district during the season of 1892 was 147 acres, divided as follows:

	Acres.		Acres.
Oranges	12	Walnuts	12
Olives	44	Mixed	36
Apricots	10		
Peaches	5	Total	147
Prunes	28		

The total acreage of trees on the Chino ranch is given as follows:

	Acres.		Acres.
Oranges	102	Figs	56
Prunes	152	Pears	15
Peaches	22	Mixed	116
Apricots	14		
Olives	54	Total	612
Walnuts	81		

In addition to citrus fruits, all the districts of San Bernardino County produce very largely of the deciduous fruits. Prominent among these are peaches, prunes, and apricots. Pears are grown to a more limited extent, and apples are grown in a few places on the mountains, no large orchards of either apples or pears being found in the valley.

The deciduous fruits find a sale at the local canneries or are dried by the growers, and exported in a dried state.

A very large area is also planted to raisin vines, and the growth and packing of raisins is an industry second only to that of citrus culture in this county.

The prune is fast coming into popular favor, and a very large quantity of land has been set to prune orchards in the past two years. Prices last season ruled low, the following figures being the prevailing rates paid for various fruits:

Navel oranges	$2 00 to $2 50 per box.
Other budded varieties	1 25 to 1 75 per box.
Seedlings	75 to 1 25 per box.
Raisins	2 00 to 4 25 per box.
Prunes (dried)	08 per pound.
Prunes (green)	30 00 to $50 00 per ton.
Peaches (green)	20 00 to 30 00 per ton.
Apricots (green)	17 50 to 24 00 per ton.

Prices for the present season ruled higher, and deciduous fruits at the following figures to the canneries or the evaporators:

Prunes	$40 00 to $60 00 per ton.
Peaches	20 00 to 30 00 per ton.
Apricots	18 00 to 24 00 per ton.

The following statement gives the exports from the Ontario district, over the Santa Fe and Southern Pacific Railroads, by months for the year 1891:

Months.	Oranges and Lemons, Boxes.	Raisins, Boxes.	Green Fruit, Pounds.	Dried Fruit, Pounds.
January	190	240	----------	2,200
February	130	260	----------	1,980
March	2,980	180	----------	870
April	1,252	160	----------	1,240
May	372	----------	1,200	330
June	90	----------	6,300	240
July	76	----------	19,430	600
August	84	----------	63,725	43,360
September	62	----------	71,030	22,110
October	58	405	102,220	68,785
November	130	5,388	118,245	171,665
December	480	4,535	25,690	19,740
Totals	5,904	11,168	407,840	333,120

This, reduced to carloads, gives:

Oranges and lemons	21
Green fruit	20½
Dried fruit	17
Raisins	11½
	70

For the present year the total shipments of fruit from this district will probably exceed one hundred carloads.

Redlands is another important citrus section that has lately come into notice, and added very largely to the total output of citrus fruits from Southern California.

In 1890 there were 1,500 acres planted to oranges in this district; last year 1,200 acres were added to this, and, in the spring of the present year, this was increased by 1,500 acres.

For the seasons of 1891 and 1892 Redlands shipped 186 carloads of oranges.

Not over 5 per cent of the trees in this district are yet in bearing, and none, even of the older orchards, have yet reached full bearing capacity.

The deciduous fruit crop this season is short in San Bernardino County, as elsewhere. Peaches yield about 75 per cent, apricots will fall below 50 per cent, and prunes are almost a total failure. The citrus fruits, however, are in excellent condition, and will return a very large crop.

Acreage and Variety of Fruits in San Bernardino County.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	107	115	222	99
Apricot	1,113	441	1,554	297
Fig	102	260	362	161
Olive	127	185	312	83
Peach	1,948	142	2,090	142
Prune	351	1,112	1,463	268
Pear	345	57	402	57
Lemon	436	567	1,003	217
Orange	26,585	9,652	36,237	3,050
Nuts—Almond	57	....	57	....
Walnut	131	70	201	50
Raisins	4,970	....	4,970	....
Table grapes	274	....	274	....
Small fruits	89	....	89	....
Totals	36,635	12,601	49,236	4,424

SAN DIEGO COUNTY.

San Diego, the southernmost county of the State, is bounded on the north by Orange and San Bernardino Counties, on the east by Arizona, from which it is separated by the Colorado River, on the south by Lower California, and on the west along its entire length by the Pacific Ocean. It is, with the exception of San Bernardino, the largest county in the State, having an area of 14,968 square miles, or 9,580,000 acres.

Much of this area is a barren waste, being included in the Colorado Desert, which in places is several hundred feet below the level of the ocean. San Diego is divided into two regions, as opposite to each other as though they were separated by the diameter of the earth. East of the San Jacinto and Cuyamaca Mountains lies a broad expanse of arid waste, treeless, waterless, and forbidding, a region where the temperature in summer frequently rises above 120°, and where the only vegetation found is the cactus, the mesquite, and greasewood; a region of dry lakes, bald granite hills, alkali flats, and parching sands. The country west of these ranges is the reverse of all this. The western slopes of these ranges are interspersed with numerous fertile valleys and mesas, where can be grown almost anything that can be found in either the temperate or semi-tropic zones. From the mountains to the ocean the country is broken and hilly, the hillsides generally free from rock and not too steep for cultivation. Among the numerous fertile valleys of San Diego, the El Cajon is justly celebrated for its fertility. The Otay country is rapidly becoming an important factor in San Diego's wealth; Oceanside, Lakeside, San Jacinto Valley, Escondido, Elsinore, Poway, Linda Vista, the National Ranch, Chula Vista, and Sweetwater, are the more prominent of the productive districts of San Diego County. The county is intersected by numerous streams, most of which are raging torrents in the winter and beds of sand in the summer months. The San Diego River, which is the most important of these, flows beneath the surface and percolates through its sandy bed to the sea. Elsinore Lake, the largest body of fresh water in Southern California, lies in the northwest corner of the county, and it serves as the drainage basin for the San Jacinto Plains.

San Diego abounds in mesa lands of a reddish color and very fertile. Near National City is a red soil, quite clayey. The slopes of El Cajon have loams much resembling Riverside lands. The Otay country is largely a black adobe, very strong, and carrying all the constituent elements of plant growth. In the Jamul and Janal regions the soil is divided between a black and gray adobe and a sandy loam. In the San Jacinto Valley and plain the prevailing characteristics of the soil are a warm sandy loam, intermixed with clay in some portions, and preserving the red color of the foothills as it recedes from the valley. The Colorado River bottoms have a soil easily worked, highly productive, and not likely to suffer from overflow. Alkali is not found in hurtful quantity, and good results may be expected when the waters of the Colorado are available for irrigation. In some sections of the desert artesian water has been found, and many hope to ripen the earliest fruits in some of those more favored localities in the desert.

The celebrity of San Diego's climate is world-wide, and probably for health and pleasure it is unsurpassed in the world. On the immediate coast it is remarkable for its equability, but for fruit growing the climate of the interior valleys, where the mercury reaches a higher elevation than on the coast, is to be preferred.

The climate of the coast region of this county is most desirable. For healthfulness and uniformity it ranks with any in the world, and has made this section a noted resort for invalids. The rainfall of the valleys and low mesas is light, and there are few cloudy days. Flowers bloom the year round, and nearly every day is the realization of ideal weather. The records of stations near the coast show that for fifteen years there has been an average each year of 184 clear days, 136 fair, and but 45 cloudy. The average number of days in each year on which rain fell was but 34. The average annual rainfall for fifteen years, near the coast, has been but 10 inches. The coast climate of this locality is entirely free from what is known in the East as the "heated term." In eighteen years the thermometer went above 90° only fifteen times, and only reached 86° twice a year on an average. The lowest mid-day temperature is 55°, and this for only a few days in the winter. The lowest point for the whole winter is 32°, or once in three or four years 28°.

Irrigation is the great want of this county, and to supply this want a number of irrigation projects have been started. Five irrigation districts have been organized under the Wright Act; these are the Elsinore, Escondido, Fallbrook, Murietta, and Perris, covering an aggregate of 74,394 acres. On the subject of irrigation in San Diego, Theodore S. Van Dyke writes:

"In the line of water development San Diego County has made more progress in the past year than ever before. The actual construction has not been as great as when the San Diego River flume and the Sweetwater dam were building, and though construction has been limited to the northern end of the county, there has been an awakening of the people to the importance of irrigation and the immediate development of the great resources that exist in that line that will, in the end, be far more valuable than the mere building of works in a few places.

"Few things have shown this more clearly than the vote of Fallbrook. In a district of 12,000 acres $400,000 in bonds were voted by a majority of fifty in a vote of ninety. If any section of this county ever had a right to boast of what it could produce without irrigation that section was Fallbrook. With about double the rainfall of the rest of the coast region, with a subsoil so retentive of moisture that good wells can be had almost everywhere in a few feet, and fair crops of corn raised without a drop of rain after planting, with a top soil so deep and rich that the most fastidious wiseacre from a western prairie has never questioned its virtues, with a climate that was all that could be desired for the choicest products that can be grown on the coast at all, it seemed absurd, for a long time, to talk of Fallbrook needing water. Yet its people have been among the first to recognize the inevitable and bow gracefully to it, instead of fighting it off several years and keeping themselves behind in the race of progress. They have found that no matter what they can do without irrigation the control of water and its proper use, with intelligent cultivation, so far excel all tillage without it that all other methods must go, and the sooner the better. It is no derogation from other sections to say that this Fallbrook Irrigation District will have the cheapest and surest water supply of any district in the county. So heavy is the average flow of Temecula Creek during the whole year that but a small amount of water need be reservoired, and all those things that need only spring or winter irrigation can have all they need without drawing on the storage at all. The entire line will be but 14 miles long, over a country presenting no engineering difficulties, and the cost has been carefully estimated from surveys already made. Fortunately for the district, the cost will be so low that it can build its own waterworks; a thing that many other districts cannot do, but have to buy from companies or divide with other districts.

"The almost unanimous vote for $1,000,000 in bonds in the Linda Vista district, on the same day as the vote at Fallbrook, was not so remarkable, because it has always been conceded that the coast mesas need water. All along the coast there has long been a desire for water. The only drawback has been a chronic unwillingness on the part of the majority of the owners to paying, either in money or dry land, anything near the dead cost of getting the water to the land. Too many wanted the water, not to raise crops of fruit, but crops of tenderfeet, and long cherished the fond hope that some benevolent gentlemen would come along with dropsical pockets and build an aqueduct beside their lands to enable them to sell to strangers at boom prices. Investigation of the cost of water, which should have been made long ago, has banished this hope, and now the people are ready to pay full value for it. Although this leaves some sections years behind where they might have been had they listened to those who had studied these matters, it is still a vast stride in progress; for when once a people resolves that it must have something, cost what it may, and has the land ready to make its resolutions good, the road will speedily be found. Linda Vista will stand second to none of the irrigation sections of the county when once watered, which can be easily done at a cost which the land can well afford to pay. This district is rich in a broad and beautiful sheet of land, which has in other places been proved to be as fertile as any of the best fruit lands of the State when well irrigated. But it is richer still in climate, and richer yet in the temperature of its soil. The difference of a few degrees in the average temperature of ground during the months of fall and winter, when the orange and lemon are making their most important growth—that of ripening up the crop—is one little thought of by the majority of land buyers, but one that means many dollars' difference in the profit to the acre.

"Upon Linda Vista killing frost is practically unknown, and the ground never gets chilled much in winter nights. Its uniform climate, never too hot, never too cold, never too dry and never too moist, for any length of time, makes it especially adapted to the lemon, while it is far enough from the sea to raise oranges that can scarcely be distinguished from the best of California, as well as all other products that can be grown on this part of the coast at all. Linda Vista will get water, and get it about as soon as any of the new districts. When it does, its 40,000 acres lying so convenient to San Diego Bay will see a rapid rate of settlement.

"With the same advantages possessed by Linda Vista, the new district of Jamacha, containing some 22,000 acres, east of San Diego, is also well blessed. It has a large area of the same warm soil, over all of which water may be easily run from two different sources. It has lately bought the reservoir site and water rights of the San Miguel Water Company, and intends to own its own water.

"The same advantages in the way of soil and climate are also shared by the new district of Otay, organized in November last. This contains over 40,000 acres, nearly all mesa, which means always warm land. Neither in this district nor in Jamacha have any bonds yet been voted, but the majority in each on the question of organization of the district settles that question beyond doubt. An abundant supply of water for this district, as well as for the Jamacha, lies in the great mountains of the interior, which can be brought down at an elevation that will reach the highest point of the beautiful and fertile table-lands. The watershed of Cottonwood Creek, the north fork of the Tia Juana River, is one of the largest and surest sources of supply in the county, and the bulk of its waters can be stored in reservoirs from the mountain park of Pine Valley down to near the line of Mexico. The reorganization of the Tecarte Water Company, which has thoroughly surveyed this watershed and its possibilities, indicates that the supply of this district may be speedily developed.

"Under works already completed, the settlement has been rapid enough to show what will happen in every section as soon as water is introduced. Under the Sweetwater dam at Chula Vista in Paradise Valley, and up the Sweetwater Valley and adjacent slopes, many new settlers have bought and begun improvements within the year, and everywhere the water touches the soil the same results are seen that have so long been proved possible in a few places with windmills. Everything here is in line with the progress in three counties adjoining. Everything goes to show that where the water ditch sparkles over the smoothest plain, and winds along the roughest hillside, there is no dullness and no lack of prosperity. Although the rate of settlement may not reach that of sections having more immediate proof on all hands of what water can do, there is more than enough to show that the claim long made in the adjoining counties, that a small farm with water was better than one ten times its size without water, was well founded, and that it applies to this county as well as to any of the others.

"The same is true of the lands lying under the San Diego flume. Many of the land owners under that system have kept themselves years behind by listening to wise men who, like a philosopher of old, evolved their knowledge of water out of inner consciousness. They, too, thought that water should be sold far below the cost of production to make dry lands worth boom prices; and the wise counselors told them that they could get it at their own figures through the law. The result has been that they are paying for it twice what they could have got it for four years ago, and four times what they could have got it for five years ago when a struggling enterprise was trying to find friends. The effects of its use have, however, been the same as elsewhere, and in El Cajon and in Spring Valley, near the line of the flume, a great number of tracts have been sold during the year with water, all of which have been planted, mostly in oranges and lemons.

"Those who want to study the effect of a few degrees difference in the temperature of the ground, should see the 10-acre tracts under the water of this flume at La Mesa, where many have been improved during the year. A careful study of these will satisfy anybody that the warmth of the ground, aside from the question of safety of the vegetation above ground from killing frosts, will in the long run, and for almost any kind of trees, more than overbalance all disadvantages, whether imaginary or real. The stranger who sees this land without water naturally doubts its capabilities. But all it needs is water and work. San Diego Bay is surrounded for many miles with just such warm lands, and probably has more of it than all the rest of the State. Nearly all of it can be irrigated, and when that is properly done it will be the cream of the State for lemons, and as good as any of it for oranges and other things.

"The irrigation district of San Marcos has just been organized, the resident and non-resident owners being almost unanimous in favor of it. It will join with the Escondido district in getting water. This will undoubtedly come from the San Luis River, and the terms of a contract have already been agreed on between the Escondido district and a responsible New York firm for the watering of that district, which will, no doubt, be extended to San Marcos. San Marcos and Escondido are united in interest by situation, climate, and trade, and largely by ownership, and they will join forces in carrying out the work themselves if all else should fail. There are no better sections of the county than these two, and threaded as they are by a railroad, and in the center of trade of a large area of surrounding country, their future is assured from the day active work on the construction of waterworks is begun. The attractive features of Escondido have made its lands sell at a remarkable rate, in spite of the lack of water, so that it requires no prophet to foretell the result when water is added. The same is the case with San Marcos. In the way of actual construction and bringing of water to distant ground, the northern part of the county is the only part that can boast of much progress for this year.

"The great dam at Hemet Valley has been under rapid construction during the year, and has now reached a height of about 50 feet. When finished this will be an immense structure, and will irrigate many thousand acres of the fertile plains of San Jacinto, in addition to the thousands now owned there by the company. The watershed is on the high mountains of the interior, where rain is always certain, and the dam will make a lake beside which many boasted reservoirs in other lands will look small. The machinery for the preparing and delivering of the stone and concrete for this dam is perhaps the most perfect ever seen, and the huge blocks of solid granite that are lifted into place like brick in the hands of a mason, will form with the concrete that is rammed between them with steel rods, a solid mass of stone that will defy the siege of ages.

"It is not often that the best energies of one county are used to benefit another, especially in this progressive State; but the fact is that the Bear Valley Irrigation Company is now doing, and will continue to do, more for this county than even for the splendid county of San Bernardino, where its works and business offices are located. Designed originally for only a small part of its own county, it has made not only the wonderful prosperity at Redlands, but in opening up new territory at Alessandro has found an easy way over the border upon land in this county whose seductive influences it has found impossible to resist, especially when they lay in the direct line of conquest.

"The portion of the great plains of San Jacinto that lies in this county is so like in every respect to the fertile margin that lies within the county of San Bernardino, and on which the prosperous settlement of Alessandro is situated, that the carriage of the waters of the Bear Valley Reservoir beyond the point first intended resulted as a matter of course. So the rich plains that surround Perris came in quite naturally for some of the water, and that district of 22,000 acres was soon provided with a contract, and the main pipe for the delivery of the water is now at the edge of the district. This region has the general characteristics of Riverside, but a few miles away, and young orange trees that have stood the coldest weather of the last five years show that the winter climate is as safe for them as is the summer. Not less important than the entering of this county is the action of the Bear Valley Irrigation Company since, and it may now be considered the largest and best of our home companies, though belonging really to another county. The purchase of the thousands of acres that form the great laguna of San Jacinto, and the raising of its mouth by a dam, together with the securing of the rights to water on the Whitewater and another reservoir site in the Potrero of San Jacinto, mean nothing less than the watering of vast tracts of this country south of Perris, for the water can go nowhere else after crossing the line of hills east of Alessandro. The fertile slopes that surround Elsinore Lake and the rest of the lands that are included in that irrigation district, the validity of whose organization has been lately confirmed by the Court, will, before long, begin to smile under the influence of its waters, and they will be extended down to where Murietta spreads out over the broad plain that needs nothing but water to cover it with prosperous places."

Artesian water is found in the San Jacinto Valley, and a number of wells have been sunk. One of these wells flows, by actual measurement, 15,000,000 gallons of clear, pure water every twenty-four hours. Through a 7-inch pipe it throws a stream 27 feet high, from a nozzle 2 inches in diameter.

San Diego has as wide a range of productions as she has of soil and climate, and nearly every kind of fruit, from bananas and pineapples to Chickasaw plums and huckleberries, can be found represented there. In the higher mountain regions apples are grown, and some fine fruit is produced; pears, plums, and cherries do well in this region also. On the lower mesas and valleys oranges, lemons, apricots, peaches, prunes, and other deciduous fruits do well. Near and at Old Town are some of the oldest olive trees in the State, while at National City, Hon. Frank A. Kimball has one of the largest olive orchards in California. The guava, Japanese persimmon, cassava, India rubber, camphor, and numerous other tropical trees have been tried and all thrive well, where the conditions are favorable.

In the vicinity of Julian apples have been grown upon five-year old trees in these mountain orchards that weighed a trifle under 3 pounds each, and from 20 to 30 ounces are not uncommon. There are trees within 3 miles of the city of Julian, the metropolis of the mountain belt, and within a few hundred feet of the summit of the great mountain divide, that have been known to produce a ton of apples to the tree, and these trees but twelve years from time of starting. Again one meets with frequent instances where these apple orchards are yielding their owners from $300 to $500 per acre, and trees not as yet in full bearing.

In the Cajon Valley last year there were made 2,600,000 pounds of raisins from a little over 3,000 acres of vineyard, from which a revenue of nearly $100,000 has been derived. In this valley Mr. S. M. Marshall has a young orchard, planted three years ago, which contains 4,000 orange trees and 3,000 lemon trees of the most approved sorts. There are more than twenty varieties of oranges, the Navels, Malta Bloods, and St. Michael taking the lead. In lemons the leading are Villa Franca, Lisbon, Eureka, and Bonnie Brae. Besides the above there are 2,000 olive and 1,000 assorted fruit and nut trees—in all about 10,000 trees—and in nursery about 60,000 orange and lemon trees, budded to choice varieties. The orchard trees are two and three years old and show considerable fruit. Mr. Marshall says that an inspection of his orchards will convince the most skeptical that El Cajon Valley can produce citrus fruits, equal in every respect to those grown in any other part of Southern California. He intends to extend his orchard the coming season, but is satisfied with his present vineyard of 125 acres.

Two large packing houses have been built, to meet the needs of the increasing raisin business in El Cajon, one by R. C. Allen, on a portion of what was known as the El Cajon Vineyard tract, and the other by J. T. Gordon, on his large ranch in the upper end of the valley. There are now five large packing houses and several smaller ones. Improved machinery has been introduced in all of the large houses for stemming, cleaning, and grading raisins.

In Poway almost every known fruit has been successfully tested except cherries, currants, and gooseberries, which require a higher elevation. The area in deciduous fruits is about 160 acres. While oranges and lemons are not produced beyond the requirements of local demand, and until better facilities for irrigation are developed, it is not deemed wise to greatly enlarge this branch of fruit culture; it is sufficiently proven that a considerable portion of the valley is admirably adapted in soil and climate to their production, and in sheltered nooks even the lime will succeed.

In 1869, J. M. Asher, now of El Cajon, and George Hazard, of San Diego, planted a few deciduous trees in Paradise Valley, the first ever planted by the hand of man on National Ranch, a tract of nearly 27,000 acres. Mr. Early, of San José, planted a few orange seeds as a doubtful experiment. The next year, Mr. Menzer put in the ground a few grape cuttings, it being the pioneer vineyard in this part of the county. In 1871, from a transplanted lemon tree, he produced one lemon, which

W. C. & F. A. Kimball took to New York as an indisputable testimony of the unequaled soil and climate of San Diego County. This was the county's first citrus fair. The progress of Paradise Valley has been steady and sure. During the past two or three years large areas have been planted to citrus fruits. The citrus area of this section has been largely increased the past season.

Lindsay & Trownsell write of the region around Escondido as follows:

"The apricot crop was light, but the fruit excellent—much better than last year. Peaches were superb; and as to size, beauty, quantity, and flavor, surpassed any others marketed in Southern California. Apple orchards round about have also yielded abundantly.

"The fig industry has also received a great deal of attention in this region. The trees grow and yield abundantly without irrigation, and the fruit is all that was ever hoped for by the most sanguine. Those put up this year have found a ready sale at from 10 to 15 cents per pound.

"Although few of our prunes are yet in bearing, a large acreage is coming on, and which is being largely increased each year. It has been thoroughly demonstrated that this is the home of the prune, hence the tendency to plant largely.

"Olives are also great favorites with our people, and the acreage planted is much larger than that of some other products. The trees are doing splendidly without irrigation, and some of them are now large enough to show what can be expected. An orchard of forty acres was set out the past season.

"As regards oranges and lemons, some of the finest young groves from one to six years old are growing and bearing in and about the Escondido Valley. Where proper locations are selected they do fully as well as in any of the brag orange-belt sections of Southern California, and the trees and fruit are here to speak for themselves.

"The Muscat raisin grapes grown in this and surrounding valleys have no equal in Southern California, as was fully attested this season, and consequently, owing to splendid drying weather in the curing season, our raisins are the very finest on the market. The crop will more than double that of last year.

"Wine grapes in the mountains and foothills were abundant; in fact, those engaged in the wine and brandy business had more grapes than they had made calculations on handling, notwithstanding their preparations for a largely increased yield. And it is proper to add that all of our grapes are grown without irrigation.

"We are also raising and marketing guavas, and the manufacture of jelly from that rich fruit is now receiving attention from several successful growers.

"Within the past two years large plantings of almonds and English walnuts have been made, and the young trees exhibit a thrifty growth."

Among the more prominent fruit districts of San Diego are Chula Vista, Otay, Julian, Escondido, Spring Valley, La Mesa, Delmar, El Cajon, Elsinore, Sweetwater Valley, and National City.

San Diego being in the southern range of counties, is prominent as an orange-producing county, and the citrus fruits form the larger part of her orchard products. In addition to these, large quantities of apricots, peaches, and prunes are grown. Of late years considerable attention has been paid to the cultivation of the guava, and of this fruit, San Diego produces more than any other county in the State.

A very large part of the acreage has been set out within the past two or three years, and there are few old orchards in San Diego County. Some of the oldest there are found in El Cajon and Sweetwater Valley. One of the largest orchards in the State is that owned by Hon. Frank Kimball, of National City.

Citrus fruits do well in all the interior valleys, and deciduous fruits thrive luxuriantly over the entire county.

There has been a very large number of new orchards planted in the various districts, of which returns have been made from the following:

Districts.	Acres in Fruit.	Planted in 1891.
Valley Center	500	200
Palm Valley	385	120
Chula Vista	2,500	180
Otay	250	130
Dulzura	300	60
San Jacinto	1,500	400
Julian	640	100
Elsinore	400	100
Cuyamaca	194	160
Lawson Valley	150	60
Totals	6,819	1,510

While these do not cover the entire county, the figures given serve to show the rapid increase of orchard planting in San Diego County.

The citrus fruits of San Diego are boxed and shipped via the Atchison, Topeka, and Santa Fe Railroad to the Eastern markets. The deciduous fruits are generally dried by the growers, and sold to Los Angeles and Eastern packers.

San Diego is famous for the superiority of her lemons, and a very strong impetus has been given to this industry of late. Some of the finest lemons produced in California are grown in San Diego County.

ACREAGE AND VARIETY OF FRUITS IN SAN DIEGO COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	705	45	750	45
Apricot	776	185	961	85
Cherry	10	6	16	6
Fig	154	137	291	20
Olive	735	328	1,063	150
Peach	608	185	793	23
Nectarine	11		11	
Prune	536	140	676	95
Pear	537	54	591	12
Plum	201	13	214	13
Quince	6		6	
Lemon	3,509	1,266	4,775	467
Orange	626	404	1,030	34
Nuts—Almond	28	46	74	46
Walnut	389	178	567	31
Raisins	3,454		3,454	200
Table grapes	510		510	306
Totals	12,795	2,987	15,782	1,533

SAN FRANCISCO COUNTY.

(City and County.)

San Francisco is the chief commercial city of the State of California, and the metropolis of the Pacific Coast. The county has little other territory than that covered by the city, and although the smallest, it is the wealthiest, most influential, and most important county of the State. Its area is 42 square miles, or 26,681 acres. Its topography can be described as the northeastern portion of a peninsula, having an average width of 15 miles and a length of 30. It is largely composed of low, sandy hills, with others of considerable height and of rocky formation. Its boundaries are the Golden Gate on the north, San Mateo County on the south, the Pacific Ocean on the west, and the bay of San Francisco on the east.

The one great feature of San Francisco, and the pride of California, is its bay. Forty miles of the bay lie south of San Francisco, and 25 miles extend north. Suisun Bay, connected with and extending east of San Pablo Bay, is 20 miles long. The average width of San Francisco Bay, as a whole, is 8 miles, the bay shore-line being over 300 miles in length. The two great rivers of the State—the Sacramento, draining the whole of the northeastern portion and the great valley of the same name, and the San Joaquin, flowing nearly the whole length of the valley whose name it bears, and having for a drainage area the vast Sierra range—unite their waters in Suisun Bay, and empty into San Francisco Bay.

The climate of San Francisco is very uniform; extremes of heat and cold are unknown. The mean temperature for July is 58.80°, for January 49.30°. It is a cool climate, frequently damp, with some foggy weather, but on the whole very pleasant, and many people come here in the summer, to escape the heat of the interior valleys, and in the winter from the East, to escape the intense cold.

During the rainy season the winds blow from the north and southeast. The number of rainy days average about 7 in November, 12 in December, 10 in January, 9 in February, 9 in March, and 5 in April. Winter is the most agreeable season of the year. During the dry season the trade winds prevail. In the months of June, July, and August heavy fogs come in from the ocean early in the evening and continue until 9 or 10 o'clock in the morning. Tender plants, many of tropical origin, thrive in the open air the year round, and flowering plants and shrubs grow with wonderful luxuriance.

From a horticultural point of view, San Francisco's importance is as a consumer and shipper of fruits. None are grown here, but the city is a vast entrepot for a large portion of the fruit product of the State. Here a large part of it is repacked and shipped green to various parts—to British Columbia, Alaska, Australia, China, Japan, the Islands, Mexico, South America, and points in our own State where some varieties are not grown. Here, too, a large amount finds its way to the canneries and to packing houses, and is shipped out as canned or boxed goods, while much dried fruit finds its way into the hands of jobbers, by whom it is reshipped to Eastern houses.

The importations of green fruit into San Francisco from all sources in 1891 was: deciduous, 6,687,000 pounds; citrus, 160,000 pounds; of this 4,052,000 pounds of deciduous fruit and 92,000 pounds of citrus fruits were consumed, the remainder being reshipped to other points. There was shipped by rail from San Francisco last year:

	Pounds.
Deciduous fruits	118,000
Citrus fruits	68,000
Dried fruits	6,478,000
Canned fruits	19,278,000
Raisins	1,050,000
Nuts	4,000
	26,996,000

In addition to this there was shipped by sea during the same period:

	Pounds.
Deciduous fruits	2,417,840
Dried fruits	747,914
Canned fruits	15,223,440
Raisins	603,520
Nuts	94,500
Olive oil (California product)	12,088
	19,099,302

Recapitulation.

	Pounds.
Shipments by rail	26,996,000
Shipments by sea	19,099,302
Total	46,095,302

Add to this the quantity of fruit consumed in various forms in San Francisco, by far the larger part of which is of California production, and the importance of San Francisco to the grower will be appreciated.

As showing the wide range of export possessed by California fruit, the following table, showing points to which shipments by sea were made in 1891, is presented:

Shipments of Fruit by Sea, 1891, to All Points from San Francisco.

Where Shipped.	Canned Fruit.		Green Fruit.		Dried Fruit.		Raisins.		Nuts.		Olive Oil.	
	Cases.	Value.	Packages.	Value.	Pounds.	Value.	Pk'gs.	Value.	Sacks.	Value.	Cases.	Value.
Amsterdam	86	$331	20	$18	700	$86	8	$35	4	$22	1	$10
Asiatic Russia	315	1,414	100	150	6,977	712	4	49	1	5		
Australia	18,130	67,045	10,056	19,427	292,687	22,408	1,764	7,614	77	476		
Batavia	1,131	4,816										
Bombay	566	2,626	1	4								
British Columbia	2,323	10,120	1,832	3,252	109,091	11,638	1,245	3,378	253	1,793	113	625
Corea	21	110										
Calcutta	426	1,942										
Central America	711	2,602	1,350	2,432	13,308	1,059	943	6,175	148	1,578	86	465
Chile	1,471	6,912	503	8,821	9,113	1,131	224	1,091	76	444		
England	172,073	754,200	125	563	10,590	1,036						
France					200	55						
Germany	8	48										
Hawaiian Islands	2,451	8,926	8,745	1,495	46,705	4,868	1,194	4,640	364	2,749	193	961
In Transit			20	50							19	213
Ireland	1,391	5,477										
Japan	2,005	10,206	1,149	2,220	6,230	633	212	519	13	150	5	14
Kirkee	13	50										
Cotta Bodja	45	165										
Marshall Islands	92	311	10	15	306	31	2	6				
Mexico	351	680	5,991	9,610	30,299	2,973	1,277	5,719	106	1,796	17	105
Marquesas	11	61	6	27			2	3	1	8		
New York	42,045	188,634			191,275	24,803					78	1,508
Padang	283	1,055										
Pekalogan	56	155										
New Zealand	3,449	13,640	100	199	29,934	2,393	589	5,283	2	31		
Penang	584	2,408										
Peru							5	180				
Rarantonga (Harvey Islands)	3	4			50	7	1	26				
Rotterdam	220	775										
Scotland	2,290	9,816										
Surabaya	1,046	4,113										
Tahiti	78	274	78	188	449	128						
Tonga Islands	25	100										
United States of Colombia	20	82	37	178			29	146				
Tasmania							45	91				
Vernan	6	24										
Totals	253,725	$1,099,122	30,123	$48,649	747,914	$73,961	7,544	$34,965	1,045	$9,052	512	$3,901

Summary, in Pounds.

		Pounds.
Canned fruit		15,223,440
Total pounds	19,099,302	
Total carloads	954	
Total value	$1,269,640	
Green fruit		2,417,840
Dried fruit		747,914
Raisins		603,520
Nuts		94,500
Olive oil (California product)		12,088

There are at the present time 43 establishments in San Francisco engaged in the wholesale handling of fruit, and over 300 people engaged in the retail trade. There are 16 packing and canning companies who are engaged in either the exclusive packing of fruit, or from whom it receives the larger share of attention.

SAN JOAQUIN COUNTY.

San Joaquin County lies at the head of the San Joaquin Valley, and is bounded by Stanislaus, Calaveras, and Amador Counties on the east, Stanislaus and Santa Clara Counties on the south, Alameda, Contra Costa, and Solano Counties on the west, and Sacramento County on the north. The two great rivers which drain the State, the Sacramento from north to south, and the San Joaquin from south to north, form their junction near the northwest corner of this county, and pour their united waters into Suisun Bay. The San Joaquin River intersects the county, and is navigable to its southern boundary the year round. The area of this county is 1,370 square miles, or 870,000 acres, generally level valley land. In the northwest, along the rivers, is a region of tule land and marshes; through the northern part of these tule lands the San Joaquin and its tributaries flow in many channels to their junction with the Sacramento. Throughout this region are numerous islands, which are subject to overflow. They have rich soil, and such as are leveed are under cultivation. Extending northward are the sandy lands, the two sections being separated by a broad belt of black loam and adobe land. The foothill region comprises a narrow strip along the eastern boundary. The lands forming the delta comprise about one fifth of the land of the county. These had to be protected from overflow by the construction of levees before they could be brought under cultivation. About 150,000 acres are in cultivation.

The Mokelumne River, an important tributary of the San Joaquin, flows through the northern part of the county, and is navigable for a considerable distance from its intersection with the San Joaquin. The Calaveras River, a stream carrying much water in the rainy season, flows through the central portion of the county.

What has been said of the climate of other counties in the San Joaquin Valley, will apply to San Joaquin County. The months of June, July, August, and September are hot, especially July and August, when the mercury will frequently pass above the hundred mark. But despite this degree of heat, it is not enervating, and except on extremely hot days, which are rare, the summer temperature is not disagreeably hot. In the winter months the mercury will sometimes drop below freezing, and harsh frosts in the early morning are not uncommon. The location of the county in the central portion of the State, and so near the only great pass through the Coast Range, by which the waters of the two great rivers of the State find their outlet to the ocean, renders the locality subject to the most favorable natural climatic influences. Heavy fogs are rare, and the chilling winds which sometimes prevail on the coast are much modified before they reach the interior.

The following table of rainfall from 1870–71 to 1886–87, will give a good idea of the annual precipitation in San Joaquin. In July and August rainfall is so rare that it may be said never to rain in those months:

Season.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	Total.
1870-71	------	------	------	.15	.67	1.35	1.47	1.70	.30	.78	.45	------	6.87
1871-72	------	------	------	.14	1.09	11.49	2.58	3.46	1.43	.51	.06	.04	20.80
1872-73	------	------	------	.03	1.37	6.25	.75	3.97	.47	.43	------	------	13.27
1873-74	------	------	------	.31	.76	3.94	3.94	1.78	3.33	------	------	------	14.06
1874-75	------	------	.23	1.09	3.45	.23	4.54	.28	.87	------	------	.45	11.14
1875-76	------	------	------	.01	5.86	2.85	3.26	2.65	3.23	.40	------	------	18.26
1876-77	.07	------	------	2.11	.30	------	3.32	.23	.75	------	.21	------	6.99
1877-78	------	------	------	.36	.72	1.31	5.45	6.70	2.56	1.01	.65	------	18.76
1878-79	------	------	------	.34	.51	.42	2.28	2.94	2.06	1.75	.96	.20	11.46
1879-80	------	------	------	.58	2.05	1.67	1.54	1.32	.89	6.28	1.10	------	15.43
1880-81	------	------	------	------	.45	7.09	2.83	2.50	.82	1.11	------	.29	15.09
1881-82	------	------	.03	.24	.73	1.65	1.27	.84	3.64	2.21	------	.11	10.72
1882-83	------	------	.50	1.86	1.11	.27	2.55	.35	2.55	1.23	4.84	------	15.26
1883-84	------	------	.18	.93	.51	1.00	1.94	4.43	6.66	2.94	.50	1.27	20.36
1884-85	------	.03	.19	1.40	------	5.69	1.23	------	.26	.77	------	.05	9.62
1885-86	------	------	------	------	6.06	1.24	5.36	.04	1.21	3.43	------	------	17.36
1886-87	------	------	------	.22	.84	.82	.36	3.78	------	------	------	------	------

Although there is a great variety of soil, it may be confidently asserted that there is no utterly barren or unproductive lands in the whole of San Joaquin County. Even in the limited mountainous district in the southwestern portion, which is so rugged and hilly as to be incapable of profitable cultivation, the land affords a fine range for stock in seasons when the usual rainfall causes the native grasses to grow in abundance upon the steep hillsides.

The western portion of the county consists of a rich delta, bordering the San Joaquin and the Mokelumne Rivers, which here have channels dividing the lands into tracts, which are designated as islands. The natural growth upon this land is a species of flag, here termed tule, which rankly grows upon the overflowed ground, and appears to the traveler upon the steamers plying upon these rivers, in some seasons of the year, like immense fields of green grain. As this kind of vegetation would indicate, the land was formerly constantly subjected to overflow, and only in the later months of the drier seasons was it free from water so that stock could range upon it. It has, however, been demonstrated that this land is among the most productive and valuable in the State, and that by the expenditure of comparatively small amounts for the construction of levees to protect it from overflows, it can be made to produce a great variety of crops. Although the reclamation of these lands was at first regarded as problematical, and many mistakes and failures marked the progress of the work during its earlier inception, enough has now been accomplished to show that the work upon a large scale is wholly practicable, and the success that has attended the efforts of those who have given the subject proper attention when constructing their reclamation works, so as to effectually secure the object sought, will encourage the owners of most of this character of land to provide for bringing it under cultivation.

In some of the reclaimed districts there are orchards of peaches and pears, which are very productive, and the small fruits, such as blackberries and strawberries, are also grown there with great profit.

In the central portion of the county and surrounding Stockton there is a large area of adobe land, a black, clayey soil, from 4 to 8 feet in depth, resting upon a subsoil of marl or a clayey hardpan. While this soil is intractable and not easily worked except when in a suitable condition, or when it contains exactly the proper amount of moisture, it is remarkably fertile. This soil with irrigation and careful cultivation will produce a great variety of crops, and has been found especially adapted to the growth of choice varieties of table grapes, as well as the pear and other varieties of fruit trees. Through the portion of the county where the adobe land predominates there are, however, many varieties of soil, all of which have been proven to be equally good for the production of the cereals, but some better than the adobe for other crops. While all varieties appear to be rich in plant-food, some are more easily worked and contain different portions of sand and alluvium matter, which makes them more suitable for growth of trees and vines.

That portion of the county lying north of the Mokelumne River was originally covered with a growth of white and live oak trees, together with chaparral and other underbrush. It was not regarded with favor by the first settlers, and was not cleared and brought under cultivation for several years after farming had been carried on to a large extent in other portions of the county. It is now, however, regarded as among the most valuable land in the State.

Along the Mokelumne there is considerable bottom land, which is overflowed in seasons of extreme high water, but which can be cultivated after the water recedes. This land is extraordinarily fertile and capable of producing an almost endless variety of crops. Along the lower Mokelumne is a large extent of territory which was classed as swamp land. Much of this has been thoroughly reclaimed, and is now profitably cultivated to cereals and other crops. Staten Island contains about 3,000 acres, and a portion of this delta formed by the two channels of the Mokelumne has been reclaimed at a great expense, and is now made very productive.

South of the Mokelumne, and extending from the swamp land to the foothills on the east, is a large area of very valuable land, the soil of which is a sandy loam, easily cultivated and well adapted to the growth of vines and fruit trees. The grape can be here successfully grown without irrigation. In the eastern portion of the county, extending from the Mokelumne River south for about 12 miles, there is considerable hilly and rolling land, the soil of which is varied, but generally a red clay, and sometimes containing gravel. At present most of this land is cultivated to wheat, but it is believed by many to be choice vineyard land, as the grapevine has been profitably grown in many places.

The land bordering the Calaveras River has generally been considered among the best in the county. Its rich, alluvial soil has always produced large crops of wheat, and those who have planted trees and vines in this portion of the county have generally been successful in growing them without irrigation.

In the southeastern portions of the county there is a large area of land with sandy soil, which was originally not considered as valuable as those portions of the county where heavier, clayey soils predominate.

It is a noticeable fact, however, that the farmers upon the sandy soil of the county are generally prosperous, and although their land may not produce so much per acre, they generally feel sure of a crop.

Upon the west side of the San Joaquin River in this county there is a body of land from 8 to 10 miles in width and extending for 25 miles, which in favorable seasons has produced extraordinary crops of wheat. The soil is a deep, sandy loam, in many places from 30 to 40 feet to the hardpan, and with a supply of water it could be made the most productive and valuable land in the county. This large body of land is an important portion of San Joaquin County, and must eventually be furnished with means of artificial irrigation from the San Joaquin River, which in seasons when irrigation is necessary to secure the growth of vegetation pours its torrents of water past the land to the sea.

The Mokelumne in the northern, the Calaveras in the central, and the Stanislaus forming part of the southern boundary of the county, are all important streams, and can be used for irrigation; but irrigation is not generally practiced, as upon much of the land crops can be produced without recourse to it. Two irrigation districts have been formed, and one, known as the Mokelumne Ditch and Irrigating Company, is in operation irrigating land near Lodi. This company was organized in 1876, with a capital stock of $100,000, for the purpose of taking water from the Mokelumne River for irrigation, manufacturing, and mining purposes. The capital stock has since been increased to $300,000. The company has built a dam 32 feet high and 277 feet long, and the line of the main canal has been surveyed from the dam to Bear Creek, a natural channel, which will be used in its distributing system. The main canal is 30 feet wide on the bottom, 42 feet at water-surface, and will carry 6 feet of water. The grade of the canal is sufficient to give it a capacity of 598 cubic feet per second. The amount of land lying under the company's main canal adapted to irrigation purposes is about 120,000 acres. It is the intention of the company to furnish water for manufacturing purposes.

Irrigation has at last received the attention of the citizens of San Joaquin County. A company with a capital stock of $500,000 has secured the rights on the Stanislaus River, and the work is progressing rapidly. By this ditch the southern and eastern portions of the county will be irrigated.

The Mokelumne Land and Water Company has already expended $50,000 on a stone dam which is being built across the Mokelumne River. This will turn a stream of water through a ditch 20 feet wide on the bottom and 50 feet on the top, over the northern and central portions of the county.

The Weller Ditch Company will furnish the central portion with a never-failing supply of water.

Within a very short time San Joaquin will have the best irrigating system in the United States.

Experiments have been made to test the capabilities of the soil and climate of San Joaquin County for the production of a large variety of fruits, and while it has been demonstrated that in locations where the conditions are favorable almost every kind of fruit tree produced in the temperate and semi-tropical regions can be successfully grown, it must be admitted that particular care should be given to the selection of varieties that are adapted to the different localities. The pear, fig, and almond tree will flourish with proper cultivation in almost all portions of the county, and in many localities without artificial irrigation. The pear tree, if given proper attention, has been proved to be very productive, and orchards have yielded a large profit to their fortunate owners. Even upon the heavier and more intractable soils it does well, and seems to be but slightly affected by the summer drought after the tree is well rooted, as it seems to draw sufficient moisture from the subsoil to secure for itself a healthy growth, and also to enable it to produce a crop of fruit. In the vicinity of Stockton, and upon land that is not regarded as the best for the growth of trees, there are trees that have regularly produced fine crops of pears, which have not been artificially irrigated for many years.

The fig tree also seems to be especially adapted to this soil and climate, and is as tenacious of life as the oak trees, which were growing upon this land when it was settled upon by Americans. The black California fig was very generally planted by the early settlers, and there are now many trees scattered throughout the State which have neither been cultivated nor irrigated for years, and yet they annually produce crops of figs, and seem to be little if any affected by the dry seasons which are so destructive to many other kinds of trees. It has also been found that other varieties of figs, which are so highly prized in other countries, and from which the fig of commerce is produced, can be successfully grown in this county, and that the imported varieties are as hardy and as well adapted to this climate as are those varieties which have been so long cultivated as to be almost natives of this State, and, like them, produce two crops each season.

The almond is another tree which has been found peculiarly well adapted to the locality, and can be profitably grown throughout the larger portion of the county. Trees which have arrived at the age when a full crop can be expected are now proving profitable to their owners, and almond orchards will eventually be among the productive industries of the county.

Walnut trees, including the black, English, and French, also do well upon most of the land in this county, and although on account of their slow growth they have not been generally cultivated, they are now beginning to be looked upon with great favor, and many are being planted each year.

The peach, apricot, and nectarine are grown successfully throughout the county, but most profitably upon the bottom lands and soils that are naturally moist.

The prune has been found to do well here, and more trees of that variety are being annually planted. The quince also flourishes, and is very productive in all portions of the county.

The small fruits, such as blackberries, raspberries, strawberries, etc., are grown throughout the county, and are particularly productive upon the reclaimed lands and the bottom lands adjacent to the rivers. These fruits can be raised throughout the county upon any land that can be irrigated, and large quantities are produced to supply the home market, and also for shipment to San Francisco.

The larger part of San Joaquin County is adapted to fruit culture, but the principal sections now devoted to orchards are found along the Mokelumne and San Joaquin Rivers, at Lodi, Stockton, and the numerous islands formed by the San Joaquin. This county is adapted to a very wide range of fruits, chief among which are apricots, peaches, prunes, almonds, with some apples, pears, plums, olives, and figs. A very large quantity of berries of all kinds is grown in the island district. These fruits are principally shipped East to Chicago, although a large amount of the second-class fruit finds its way to the canneries of San Francisco and Sacramento. Besides the fruit shipped green, a large amount is annually dried, which is disposed of to San Francisco and Eastern jobbers. In packing for the Eastern market, peaches are packed in 20-pound boxes, pears in 40-pound boxes, and prunes in boxes and crates. The regulation packages are, peach boxes, 24 by 12 by 4½ inches, holding two tiers and weighing 20 pounds. These cost 5 cents each to the grower. Pear boxes are of the same dimensions, but are 9 inches deep, and cost 9 cents.

The shipment of fruit from Stockton in 1891 was 650 tons, but as the orchards of San Joaquin County were generally young, and as a large portion of them are not yet in bearing, this quantity will be very largely increased year by year.

There has been a great deal of planting done in many sections of the county during the last spring, principally apricots, almonds, olives, pears, and peaches.

The report of the present season's crop from San Joaquin is better than from most parts of the State: peaches and apricots, fair; almonds, good; grapes, extra good at Stockton; on the Calaveras and on the Mokelumne, not over two thirds of a crop.

Among the large orchards which have been planted in San Joaquin County within the last few years, are those of S. D. Woods, at Stockton, 120 acres; Armstrong & Cole, Lodi, 640 acres; Strong & Williamson, Acampo, 320 acres; Buck & Corey, Acampo, 400 acres; B. F. Langford, Lodi, 140 acres; E. Lawrence, Lodi, 30 acres; L. Mowrey, Lodi, 320 acres; Dr. E. T. Grant, 100 acres; E. L. Wilhoit, Acampo, 30 acres; M. Van Guelder, Acampo, 320 acres; T. H. Williams, Undine, 200 acres; Mr. Gregory, Linden, 100 acres; J. D. Corey, Linden, 80 acres; W. H. Hickey, Linden, 80 acres; W. C. Gillingham, Lockeford, 80 acres; Jos. Buttman, Clements, 80 acres; H. H. Moore, Stockton, 80 acres.

ACREAGE AND VARIETY OF FRUITS IN SAN JOAQUIN COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	35	40	75	20
Apricot	323	370	693	94
Cherry	46	65	111	30
Fig	42	113	155	50
Olive	1	83	84	12
Peach	324	506	830	231
Prune	366	145	511	57
Pear	124	256	380	61
Lemon		1	1	
Orange	1	37	38	8
Nuts—Almond	97	755	852	25
Walnut	27	42	69	3
Raisins	618		618	
Table grapes	1,043		1,043	
Small fruits	520		520	
Totals	3,567	2,413	5,980	591

SAN LUIS OBISPO COUNTY.

San Luis Obispo County is bounded along its entire western side by the Pacific Ocean, on the north it is bounded by Monterey, on the east by Kern, and on the south by Santa Barbara County. Its area embraces 3,578 square miles, or 2,214,000 acres, and extends from the summit of the Coast Range on the east to the ocean on the west.

The county is traversed by a low range of mountains running northwest to southeast, dividing the county into two unequal parts, one third being on the coast and two thirds being in the interior. The elevation and trend of this range adapt it to catch all the rains of the winter, giving it and the subjacent country an abundance of water. Springs are numerous from base to summit, and many streams run perennially through deep valleys down either slope. The largest of these streams on the western slope are the San Simeon, Santa Rosa, Villa, Old Creek, Mono, Chorro, San Luis, Pismo, Arroyo Grande, Suez, Huasna, Alamo, and Cuyama.

From the northeastern slope of this range flows the Salinas with its many branches, the San Juan from the far east, Santa Margarita, Atascadero, Paso Robles, San Marcos, Nancimiento, the latter receiving the Los Tablas, flowing northerly between the Santa Lucia and the range called the San José by the United States Geological Survey.

The valleys of San Luis Obispo County are many and fertile. West of Santa Lucia is the coast region, a broad area of foothills and valley land, with the specially named valleys of San Simeon, Santa Rosa, Green, Villa, Old Creek, Morro, Chorro, Los Osos, Laguna, San Luis, Corral de Piedra, Arroyo Grande, Huasna, and Cuyama, and east of the dividing mountains are the great valleys of San José, or Pozo, Santa Margarita, Salinas, Huer Huero, San Juan, Carrisa, Elkhorn, Estrella, Pala Prieta, Cholama, and those of many streams. The Estrella is one of the large valleys of the east, an elevated plain bordering the Estrella River, and north of it is the similar plain of Cholame.

In climate San Luis Obispo County differs little from her neighbor on the south, Santa Barbara. On the immediate coast the heat of the summer is very much modified by the ocean breeze, and in the winter months warmth from the same source prevents extremes of cold, and hence the climate is equable the year round. In the interior valleys the heat is more intense in summer, and occasional frosty mornings occur in winter. Speaking of the thermal belt in San Luis Obispo County, Myron Angel writes:

"This is a pleasant term for that ill-defined region which is supposed to border every valley and to extend at a certain elevation along the coast of Southern California. Almost every section of California has its 'thermal belt,' each differing from the other according to the locality and the latitude, for it is certain there are climatic changes with the latitude, though slight. Thus, the foothills of the Sierra Nevada, and the slightly elevated regions of Vacaville, and Madison, and Winters in the Coast Range, are in the thermal belt surrounding the Sacramento Valley, and these are the favorite fruit sections of the north. But in those localities frosts are quite heavy in winter, which is favorable for deciduous fruits, but not sufficiently severe to be damaging to citrus fruits. In such comparison we might say that all the coast region of San Luis Obispo was in the thermal belt, but here it is not so estimated. The thermal belt is that region where frosts are unknown, where the winds do not sweep too severely, where the air is unburdened by fogs, and the genial sun of summer fructifies and enriches the fruits of the earth. Along the coast throughout this county frost is rarely seen, in many places never, and still, near the ocean, grapes do not ripen, nor do citrus fruits grow successfully. There is here a distinctive thermal belt, such as we have mentioned, lying between the altitudes of 100 and 600 feet of elevation, where there is not a damp and level valley. All the little ridges of this region lift themselves above the frosts of night, and everywhere all delicate plants grow without danger. The distinctive belt is that lying east and north of the city of San Luis Obispo, skirting the base of the hills and extending along the mountain side. There frosts are unknown, and tomatoes and other delicate plants furnish their flowers and fruits, regardless of the month or the season. There are the oldest orange trees of the county growing from the seed, planted as an experiment, and coming into bearing when eight years old, producing an excellent fruit. With this proof of success others made the trial, and the most delicious oranges now known grow in this belt. Wherever it may be followed, north or south, to the elevation of 600 feet, this band of genial temperature will be found, the most certain in its products of any portion of our favored region."

The rainfall of San Luis Obispo averages a litttle over 21 inches, the rainy season commencing usually in October, in which month the first early rains may be looked for, and continuing until the following May. In October and May, however, but little rain falls, the season being included really in November and April. The heaviest rainfall of which any record was kept was in the season of 1883–84, when 42.40 inches were recorded; the lightest was in 1876–77, when but 8.15 inches fell.

The soil on the coast is rich and deep, alternating adobe and sandy loam, the former predominating. That of the eastern part is deep, rich, sandy loam, with slight traces of light adobe, and in both sections, from the low valleys to the tops of the highest hills, is of the best quality. In the foothills the red lands peculiar to their formation prevail. It is a sharp, gravelly soil, with a large admixture of adobe, and is easily worked and very productive.

San Luis Obispo does not take rank among the leading horticultural counties of the State. Yet from what has been done in this line there it is evident that she has great capabilities. Nearly the whole range of fruits do well there wherever they have had proper care. Fruits of the citrus variety are grown successfully in favored locations. There may be seen in full bearing all the fruits that are grown anywhere in the State, including oranges, lemons, olives, figs, apples, pears, peaches, prunes, apricots, nectarines, almonds, walnuts, wine and raisin grapes. In the Arroyo Grande section fruits and vegetables of all kinds are produced in profusion, and of a size and quality that are astounding even in this State of wonderful growths. On the coast side the apples and pears rank among the best, while in the interior the prune, apricot, and olive are the favorites. On the hills the choicest wine, raisin, and table varieties of grapes are produced. Near Templeton is one of the largest bearing prune orchards in the State, consisting of 250 acres. Considerable attention has been paid to the raisin business.

The fruit interests in the immediate vicinity of Paso Robles attract much attention, although the orchards are young. Prunes, olives, apricots, pears, and peaches take a front place in our State exhibitions.

Particular notice should be made that fruit trees bear at a younger age than in most sections, prunes at three and olives at four years bearing quite a crop.

East of the Santa Lucia Mountains a large section of the country is specially suited to fruit culture, notably around Creston, Templeton, Paso Robles, and, in fact, all of the Salinas Basin and the San José Valley.

In the valleys around the city of San Luis Obispo the fruit raiser reaps a rich reward for his labors, especially with nuts, oranges, lemons, figs, and olives, the latter being a very remunerative fruit, and growing luxuriantly. The southern portion of the county is well adapted to all fruits; especially must the valley of the Arroyo Grande be named, and it would be hard to say that one portion of the county is better than another for general fruit raising.

The chief fruit sections of San Luis Obispo County are Paso Robles, Cambria, Templeton, and the country adjacent to the town of San Luis Obispo. These sections are devoted chiefly to apples, peaches, pears, grapes, olives, prunes, and plums, all of which do well when proper attention is paid them.

While the Mission orchard of San Luis Obispo is one of the oldest in the State, having been planted by the Franciscan friars in the last century, San Luis Obispo has never figured as a fruit county, and it was not until the last few years that any extensive planting of orchards was done. Of late, however, considerable acres of land have been set to fruit in different parts of the county. As these orchards are all young the output of fruit there has not exceeded the local demand, and little, if any, has found its way to the outside market. The fruits grown there are generally very fine in quality, the olive doing especially well. The yield for the present season has been very light, owing to a late frost which injured the crop of San Luis Obispo in common with the rest of the State. Prune trees suffered severely, and the returns from these was almost a total failure. Peaches were very light, and other fruits fell below the usual average.

East of the San Lucas range is found the chief fruit section of the county, where there are some 5,000 acres in fruit of various kinds, of which between 300 and 400 acres were planted in the spring of 1891.

There have been a great many Swedish settlers who have located in the vicinity of Paso Robles and elsewhere in San Luis Obispo, most of whom have set out small orchards of from 5 to 10 acres each.

Among the more important plantings is that of the Upoma Land Company, who last spring set out 220 acres in the following fruits:

	No. Trees.		No. Trees.
Apricots	8,500	Apples	1,000
Prunes	10,000	Pears	200
Nuts	12,200	Peaches	1,000

It is the intention of this company, during the coming season, to add to this 5,000 peaches, 1,000 nuts, and 1,000 pears. The total acreage in fruits is 4,059, of which there were planted during the spring of 1891:

	Acres.		Acres.
Deciduous fruits	907	Walnuts	30
Raisins	12		
Oranges	5	Total	956
Almonds	2		

Acreage and Variety of Fruits in San Luis Obispo County.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	219	151	370	54
Apricot	232	134	366	112
Cherry	91	21	112	21
Fig	24	10	34	10
Olive	84	44	128	44
Peach	306	203	509	82
Prune	828	316	1,144	100
Pear	141	214	355	95
Lemon	104	36	140	28
Orange	15	5	20	5
Nuts—Almond	23	16	39	10
Walnut	245	234	479	108
Table grapes	925	----------	925	----------
Small fruits	25	----------	25	----------
Totals	3,262	1,384	4,646	667

SAN MATEO COUNTY.

San Mateo County is bounded on the north by San Francisco, east by the bay and Santa Clara County, south by Santa Cruz County, and west by the Pacific Ocean. The county is 5 miles wide where it adjoins the City and County of San Francisco. To the southward it rapidly widens, and attains a width of 20 miles in the center of the county, and much over that distance at its southerly line. Its length is 42 miles on a straight center line. Its area is 459 square miles, or 303,500 acres. It has a frontage of 65 miles on the ocean and 35 miles on the bay of San Francisco. Its frontage on the bay is a gradual slope from the foothills of the Santa Morena range to tidewater. This slope skirts the bay shore, and is flanked by the Santa Morena range, which separates it from the Pacific Ocean.

San Mateo County covers the larger part of the peninsula which bounds the bay of San Francisco on the southwest, being separated from the Golden Gate only by the city of San Francisco. This peninsula, about 5 miles wide along the line of division, broadens rapidly towards the south to a width of 15 miles. The greatest length of San Mateo, from northwest to southeast, is 35 miles. Beyond the southern verge of the San Francisco hills the bay sweeps abruptly inland. Low headlands extend southerly in irregular indentations to the county line, where the bay curves gently inland, again forming a crescent at the foot of Visitacion Valley. South of this valley the hills rise abruptly to the summit of Mount San Bruno. The Coast Range, which runs through the west of the county, has at the southern line a width of fully 9 miles of broken and semi-detached ranges, and an average altitude of about 2,500 feet.

The topography of the county governs the climate. The Santa Cruz Mountains continue their course through San Mateo County. They trend to the northwest, and at a point 14 miles from the straits through which the waters of the Pacific Ocean flow into the bay of San Francisco, they rapidly fall in height, and seem to lose themselves in the ocean. From this point to the south side of the Golden Gate the face of the ground is broken into low, rolling hills and sand dunes of variable heights. The northwest summer trade winds, accompanied by detached drifts of fog, sweep over the depression, and give San Francisco its harsh but not unhealthful summer climate.

South of the point of the peninsula the mountains rise rapidly, attaining a height of 2,500 feet above the level of the sea. This range turns the current of the sea breeze, and holds back the fog which crawls up the slope and banks itself along the summit, as though it had become entangled in the trees and shrubs which crown the crest of the range. This mountain fog bank is the condensed freshness of the sea, out of which a cool breeze flows down the easterly slope of the range to the bay shore, cooling the atmosphere without the inconvenience of the propelling winds or actual contact with the fog. In other words, the air warmed by the morning sun rises up and checks the fog, while a cool breeze flows down the slope to replace it.

The climate is, in fact, a successful blend of the sea breeze, having a normal temperature of 55°, with the warm air of the Santa Clara Valley, which meets it from the south. The combine affords every element of physical comfort, an average temperature of 72° in summer, and rarely, if ever, below 36° during the coldest winter nights, which occur usually between the 15th of December and the 15th of January.

Springs of excellent quality and quantity of water are numerous on the ocean side of the Santa Morena range. There are many streams which carry, or did until otherwise appropriated, a liberal volume of water to the sea. The most important are Pillarcitos, Lobetos, Tunitos, San Gregorio, Pomponia, Pescadero, Butano, Gazos, and New Year Creek. On the bay side the water is not so abundant.

The soil of San Mateo is generally a warm, sandy loam, with an admixture of adobe in some localities. There are about 23,000 acres of salt marsh land on the bay side.

San Mateo does not rank among the leading horticultural counties of the State. At Pescadero some excellent apples are grown, and fair peaches, prunes, and some other fruits. The great interests of San Mateo are dairying and vegetable growing for the San Francisco market. That fruit would do well, if attention were given it, is shown by the statement of a fruit grower near Redwood City, who has a farm of 22 acres of healthy trees in the foothills, from which he reports the following yield:

625 Bulgarian prune trees, 73,131 pounds, at 1¾ cents	$129 83
395 Petite d'Agen prune trees, 31,509 pounds, at 2 cents	690 19
301 Silver prune trees, 28,082 pounds, at 2½ cents	702 65
847 apricot trees, 101,257 pounds, at 2 cents	2,025 14
99 Coe's Golden plum trees, 10,347 pounds, at 2 cents	506 94
2 acres Japanese plum trees, 8,663 pounds, at 2½ cents	216 67
Total	$4,271 42

Within 3 miles of Redwood City there is a still more important experiment. Five years ago 100 acres of fruit were planted—60 in apricots and 40 in prunes. The apricots bore two years since. There were 100 trees to the acre, and the fruit the first season was sold for $2 a tree, gathering at purchaser's cost. Olive trees have, at the age of three years, produced quite a crop of fruit.

The chief fruit sections of San Mateo are Woodside, Menlo Park, Redwood City, San Mateo, and Belmont. These are adapted to the growth of all kinds of deciduous fruits. Grapes are grown in large quantities around Searsville and Woodside. Apples, pears, plums, cherries, quinces, and berries do especially well. San Mateo finds its market in San Francisco, which it adjoins on the south, and its fruits are usually shipped in the green state. There were exported last season:

	Boxes.
Apples	300
Pears	140
Plums	200
Cherries	300
Total	940

The orchards in this county are generally small, being planted for family use, and ranging usually from one half to two acres in extent. But little new planting has been done.

ACREAGE AND VARIETY OF FRUITS IN SAN MATEO COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	140	9	149	3
Apricot	45		45	12
Cherry	5		5	
Fig	1		1	
Olive		28	28	12
Peach	12		12	
Prune	16	32	48	9
Pear	26		26	
Nuts—Almond	5		5	2
Walnut	1	2	3	1
Raisins	10		10	
Table grapes	100		100	
Totals	361	71	432	39

SANTA BARBARA COUNTY.

Santa Barbara County lies between San Luis Obispo and Ventura Counties. It is bounded on the west by the Pacific Ocean, and on the south by the Santa Barbara Channel, with its outlying islands. Below Point Concepcion the coast-line bends sharply to the eastward, and parallel with the line the Santa Ynez Mountains, for 3,000 to 4,000 feet in height, traverse the county from east to west. Beyond this range, running in a northwesterly direction, lie the San Rafael Mountains. The area of the county is 2,265 square miles, or 1,450,000 acres. A large portion of the northeastern portion of the county is a rugged mountainous region, largely worthless for horticultural pursuits, yet there are small valleys running up into these mountains which are pleasant and fertile. The Santa Ynez Mountains divide the county into two portions, the northern and southern, the former being much the larger and comprising four important valleys: Santa Maria, Lompoc, Los Alamos, Santa Ynez. The latter, that portion between the mountains and the ocean, is known as the Santa Barbara Valley, and comprises the smaller valleys of Carpenteria, Montecito, Goleta, and Elwood.

Traversed by mountains, there must, of course, be waste land, but there is the following acreage available for practical uses:

	Acres.
The Santa Maria Valley, with the valleys that open out of it and that pertain to it, and the slopes of the foothills that bound it	250,000
The Los Alamos Valley	150,000
The Lompoc Valley	230,000
The Santa Ynez Valley	200,000
The Santa Barbara Valley	108,000
Two islands	150,000
Total	1,088,000

The Santa Barbara Valley lies between the Santa Ynez Mountains and the sea, and has a world-wide celebrity for the fertility of its soil and the healthfulness of its climate. Between the Santa Ynez and the San Rafael ranges is the valley of Santa Ynez, widening into a broad extent of agricultural land and watered by the Santa Ynez River, which empties into the Pacific Ocean. The Santa Maria River on the northern limits of the county also drains a rich extent of farming lands.

The Santa Ynez Valley comprises about 120,000 acres of excellent arable land, mostly rolling. The Santa Ynez River runs the whole length of the valley, which is also watered by numerous creeks. The climate differs from that of Santa Barbara, being warmer in summer and cooler in winter, but the heat is dry and not oppressive, cool nights being the rule, while the winter is clear and bracing.

The Los Alamos Valley comprises about 40,000 acres of the richest of agricultural land, and as much more in the hills tributary to it of excellent grazing land. The valley is situated between two ranges of hills or low mountains, that separate the Santa Maria and Santa Ynez Valleys, and about 25 miles back from the coast.

Santa Maria, the largest and northernmost valley of Santa Barbara County, lies along the river of the same name, on the boundary of San Luis Obispo County. This valley, including its upper extension, the Sisquoc, is 30 miles from the foothills to the sea; its width, including the adjacent mesa lands, is from 3 to 10 miles. Many tributary cañons break into it through the hills, mostly small, but containing rich, protected, and generally well-watered land, excellently adapted to all kinds of deciduous and citrus fruits. The main valley has perhaps as varied resources as any in the State, on account of its large extent and consequent differences in climate and soil. On the west it opens to the sea, and has a heavier soil and more fog. The soil of the middle valley is a sandy loam, whilst that of the Sisquoc and the tributary cañons is deeper and richer. The lower and northern valley, especially the Oso Flaco side, grows large crops of beans, potatoes, etc., whilst farther up wheat and barley are yet grown. The future of the valley lies in its adaptability to fruit culture, in the parts best adapted for the special kinds.

There are very few portions of the world which can show so remarkable a climatic record as Santa Barbara. In the twenty years from 1871 to 1891, the temperature but once reached so low a point as 31°, and once as high as 102°. The average at Santa Barbara for thirteen years varied from 55° to 71°, a range of but 16° in all that period. Other records show a total of 310 pleasant days in a single year, 29 cloudy days, 12 showery days, 10 windy, and 5 rainy. In all there were but 29 days in the entire year during which an invalid could not be out of doors with safety and comfort during the whole or a portion of the time. The temperature of the water of the ocean at Santa Barbara shows a variation of but 6° between summer and winter. It is no uncommon sight to see persons enjoying a surf bath in midwinter on the beach at Santa Barbara.

The following synopsis of the weather for the year 1891 is compiled from daily observations of temperature as shown by self-registering thermometer in the observatory of Hugh D. Vail, and the movement of the wind as measured by a Robinson anemometer:

	Mean Temperature	Mean Temperature of Warmest Day	Mean Temperature of Coldest Day	Rainfall—Inches	Wind—Miles	Relative Humidity	Clear Days	Fair Days	Cloudy Days
January	54.4°	61.5°	47.5°	.45	3.4	59	28	3	0
February	52.6	59.2	47.5	7.92	4.5	74	15	5	8
March	56.6	64.5	50.0	1.56	4.6	71	22	4	5
April	56.3	62.8	51.2	1.75	4.1	75	22	3	5
May	59.0	63.0	55.7	.30	3.8	76	10	4	17
June	62.5	70.5	56.2	.00	4.3	72	24	5	1
July	67.0	78.2	61.5	.00	3.8	78	21	6	4
August	69.1	76.5	63.0	.00	3.5	75	26	3	2
September	69.3	77.5	63.0	.15	3.5	69	23	4	3
October	63.0	72.5	58.2	.00	3.0	75	17	8	6
November	58.8	65.5	53.0	.00	2.6	70	22	5	3
December	51.9	61.5	43.5	2.43	4.7	61	24	4	3

The mean temperature of the year was 60°, differing by less than one tenth of a degree from the normal.

The highest temperature during the year was 96°, and the lowest 33°. There were 36 days when the temperature rose above 80°, and 35 nights when it did not fall below 60°.

Of the 365 days in the year, 254 were clear, 54 fair, and 57 cloudy.

Rain fell on 20 days, with a rainfall of 15.44 inches, being 2.70 inches below the average. Between the 18th of April and the 4th of December, a period of 230 days, the rainfall was less than half an inch.

The mean velocity of the wind for the year was 3.8 miles per hour; the greatest for any one month, 4.7 miles, in December, and the least, 2.6 miles, in November. The greatest movement of the wind in any one day was 276 miles, on the 2d of December, being an average velocity for the twenty-four hours of 11½ miles an hour.

The arable soil is for the most part either alluvial or adobe. The alluvial soil, found usually in the lower levels, is very deep, rich, and fertile. It is this soil that produces the Lima beans, for which Santa Barbara County is celebrated, and affords fresh strawberries and vegetables every week in the year. This soil grows well all varieties of fruits found in the eastern New England States, besides prunes, figs, olives, peanuts, English walnuts, grapes, plums, lemons, limes, oranges, loquats, guavas, persimmons, cherimoyers, dates, bananas, and numerous other semi-tropical fruits.

The adobe soil is black and quite fertile. It is best adapted to barley, mustard, oats, wheat, or flax, and furnishes the richest of pasturage.

While Santa Barbara does not take a stand in the front rank of horticultural counties of the State, sufficient has been done to show that in soil and climate she is adapted to the culture of a wide range of fruits. Rev. Mr. Jackson, speaking of the fruits of this county, says:

"One who has lived in a temperate zone may write down the names of all the fruits he ever saw, and then add to the list all those his memory can call out of the books he has read, and in this county he shall be reasonably sure of finding them. Could it be shown that the primitive Eden bore as many fruits pleasant to the taste, it would add a new pang to the thought of original sin."

Stripped of its poetical hyperbole, the statement of Mr. Jackson conveys a truth. Santa Barbara is fitted for a higher place in the fruit-growing counties than she has occupied. Apples unsurpassed for size and flavor are produced around Santa Barbara and Lompoc. The peach, pear, apricot, nectarine, quince, plum, and prune trees bear early and extensively.

More attention has been paid to olive culture in this county than in any other county in the State, it having received a strong impetus from the success which attended the orchard of Hon. Ellwood Cooper, near Santa Barbara. In the Santa Ynez Valley large tracts have been set to olives. The soil here is diversified, and comprises rich bottom lands and rolling hills of a gravelly and sandy loam. This latter soil has been found peculiarly adapted for olive culture, and the industry has already assumed the proportions of a specialty. There are now planted over 30,000 olive trees, and a mill for the manufacture of oil has just been completed. The pioneer orchard belongs to Mr. Ralph R. Selby, of Ballard. Adjoining this property lie the orchards of Messrs. Hayne Bros. & Gould, comprising 13,000 trees, and up the valley are situated the ranches of Messrs. A. S. and A. M. Boyd, comprising 4,000 and 5,000 trees, respectively. The raisin, wine, and prune industries have been successfully prosecuted by Mr. Louis Janin, who also has a fine apricot orchard, while Mr. Max. Dormer has a thrifty young peach and prune orchard of some 14,000 trees. There are numerous small orchards of from 5 to 20 acres scattered through the valley.

Horticulture has also made rapid strides in the Santa Maria Valley. One hundred thousand trees have been set out within the last few years, and hardly an appreciable area seems as yet under cultivation. Prunes, apricots, and walnuts are the main output so far, though other fruits, such as apples, pears, peaches, and grapes do well. Citrus fruits require irrigation. No general plan of irrigation has yet been introduced; however, where locally irrigated, the lemon and orange do well.

In the Lompoc Valley the apple and pear do well, while the peach, apricot, cherry, plum, prune, and quince do fairly well. Berries of all kinds are produced in abundance also.

At Montecito all the field and orchard crops grow to perfection. A lemon is produced here that, on account of its excellence, has a market of its own. In the nurseries and dooryards are found tropical, palm, and other trees that are grown nowhere else on our coast.

The fig thrives throughout the warmer portions of the county, bearing two crops in a season, and the trees are long-lived and subject to no insect pest or disease. The Japanese persimmon is now found quite plentifully at the fruit stands, and is beginning to find favor. Two varieties of the guava are grown here; the loquat is finding friends; pomegranates grow easily; the cherimoyer, or custard apple, is well perfected near Santa Barbara, and the white zapota is also found. Date palms are in bearing, bananas are perfected in the sheltered coast valleys, and there are many other semi-tropical productions that will no doubt find here congenial conditions.

All kinds of nuts, too, grow wonderfully in Santa Barbara. It contains the largest English walnut orchard in the world. The acreage in almond trees is increasing; the Italian chestnut thrives in the deep soils; the Japan chestnut has been recently introduced; the black walnut of the East is fruiting in many places in and near Santa Barbara; the butternut and pecan both make a rapid growth; and the peanut takes kindly to the valley's sandy soils.

The principal sections devoted to fruit in Santa Barbara County are Carpenteria, Montecito, Elwood, Livas, Santa Maria, and Lompoc, and the favorite fruits are walnuts, almonds, olives, Japanese persimmons, and all kinds of deciduous fruits. These are usually marketed to San Francisco, Denver, Chicago, and St. Louis. Bartlett pears and citrus fruits are shipped green, other varieties being dried and sacked. There was a very large output of pears, apricots, and peaches last season; but the indications for the present year are for a very large shortage in the yield.

Dried apricots and peaches brought 7 cents a pound at Santa Barbara last year, while this year jobbers are offering 12 cents for the same quality, F. O. B.

The earliest walnuts planted in Santa Barbara County were those put out by Russell Heath, of Carpenteria. Hon. Ellwood Cooper introduced olives and almonds, and the Hollister orchard is the pioneer in citrus fruits.

Until the present year the principal markets were mostly local, but the Pacific Coast Railway has lowered rates for the purpose of carrying fruit to the Santa Maria cannery in San Luis Obispo County, which has added a great stimulus to the export trade. The greater part of the fruit is shipped in its green state, a small quantity being dried, but none canned.

The acreage in fruit in this county will foot up about 18,000 acres, of which 4,000 acres were planted during the past season. Of this there are about 3,000 acres in the Santa Ynez Valley and 1,000 acres in the vicinity of Ballard. Two thirds of this acreage has been planted within the past four years, and the trees are just coming into bearing.

Santa Barbara is one of the leading counties in olive growing, and a very large acreage in olive trees is planted here. This industry was introduced by the Hon. Ellwood Cooper, who has an orchard of over 100 acres, the larger part of which are in bearing. The output of olive oil from this orchard in 1891 was 34,000 bottles.

ACREAGE AND VARIETY OF FRUITS IN SANTA BARBARA COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	289	128	417	104
Apricot	762	159	921	111
Cherry	108	92	200	71
Fig	450	300	750	119
Olive	565	306	871	209
Peach	549	112	661	82
Nectarine	11	21	32	18
Prune	659	168	827	112
Pear	200	108	308	78
Quince	20	....	20	....
Lemon	476	800	1,276	309
Orange	224	116	340	92
Nuts—Almond	240	100	340	71
Walnut	1,117	786	1,903	172
Table grapes	573	....	573	....
Totals	6,243	3,196	9,439	1,548

SANTA CLARA COUNTY

Santa Clara County has an area of 1,750 square miles—1,120,000 acres. It is surrounded by Alameda County on the north, Stanislaus and Merced on the east, San Benito on the south, and San Mateo and Santa Cruz Counties on the west. The county is near the geographical center of California, and immediately south of San Francisco. Its eastern boundary is the summit of the Coast Range, and its western the crest of the Santa Cruz Mountains. It extends southward 52 miles and has an average width of 34 miles. Its principal valley is the Santa Clara, which is 34 miles broad at the north and has an average width of 15 miles. Encircling the level lands of the valley is a wide region of rolling hills, beyond which rise the mountains, culminating at the western side in Mount Bache, 3,780 feet, and on the east in Mount Hamilton, 4,250 feet. Of the total area of the county it is estimated that 800,000 acres are suitable for the cultivation of fruits and vines; of these something more than 250,000 acres are in the valley and 300,000 acres in the foothills.

Looking down the valley from some elevated point in the surrounding hills, the general contour presented is that of a level plain, while it is, in fact, a series of gentle undulations, with marked variations in the character of the soil. In what is now, or recently has been, the lower portion of this plain, the soil is a black, tenacious clay known as "adobe." While very fertile and productive, it requires much care as to the time and manner of cultivating it, and is well adapted to hay and grain. The higher lands of the valley are a light, loamy, and sometimes gravelly soil. This is easily cultivated, and is adapted to all kinds of cereals and most varieties of fruits.

The "warm belt" is a tract upon the slopes of the hills which environ the valley. It has an altitude of from 600 to 2,000 feet. It is generally, and in some localities wholly, free from frost. In this belt, to the east of Milpitas, potatoes, peas, tomatoes, strawberries, etc., are grown through the whole winter for the San Francisco market.

Upon the Los Gatos and Guadalupe Rivers, in the immediate vicinity of San José, are some hundreds of acres, formerly dense willow thickets, but now in the highest state of cultivation. These lands, which are known by the general name of "The Willows," are regarded as the most desirable in the valley, and abound with lovely homes surrounded by splendid orchards. The soil is a sedimentary deposit, easily cultivated, requiring but little irrigation, and producing every variety of fruit and vegetable common to California.

In the southern portion of the valley the soil is especially productive. Over a considerable portion the subterranean moisture maintains the growing pastures throughout the year, and some of the most successful dairies in the State are established there. The more elevated portions of this part of the valley are well adapted to fruit and vines.

The valley is drained by a number of streams, the principal ones being the Los Gatos, Guadalupe, and Coyote Rivers. In summer time these watercourses greatly diminish, and the smaller ones wholly disappear. Having their sources in the surrounding hills, and sinking as they approach the valley, they augment the subterranean resources which supply the artesian wells. These are found all over the valley. They are usually from 60 to 100 feet in depth, though some find a larger and more permanent supply at a much greater depth. In the country the water is raised by windmills into tanks, furnishing an ample supply for household and gardening purposes, while the cities and larger towns are provided with reservoirs and complete waterworks systems.

So wide is the divergency in the character of the soil in different localities, that agriculturists are reluctant to express an opinion as to comparative merits, each section having demonstrated its fitness for growing some of the almost endless varieties of fruits and vines, which are here cultivated at almost fabulous profits. While there is no better soil in the world for the production of wheat and barley, the area devoted to the cultivation of these cereals is yearly decreasing, owing to the much greater remuneration obtainable from the growing of fruits, grapes, berries, and vegetables.

Alvisa district has rich black loams, so highly prized for small fruits and vegetables, and the San José and Santa Clara regions have lighter loams and sedimentary deposits, valued for stone fruits. The shallower gravelly loams of the hillsides are also very desirable. Along the streams the land is deep, well drained, and very rich in desirable elements. Red chemisal and chaparral land on the hillsides of Santa Clara Valley has recently been put in fruit. Although reddish brown when dry, and inclined to form hard lumps, its supply of potash, lime, and humus is such as to promise very well under good cultivation.

The higher lands are of light loam, and in some places gravelly. They are composed of a black, tenacious, and wonderfully fertile clay loam. Along the banks of the streams the soil is of great depth and richness, while on the borders of the bay are thousands of acres of salt marsh, which, when reclaimed, are found to be the most productive. There are many small farms: 1,368 tracts of 10 acres or less, and 1,448 tracts of from 15 to 40 acres.

The mountain ranges which surround the Santa Clara Valley very materially modify the climate, shutting off, to a great extent, the fogs which prevail on the immediate coast, and the hot winds from the San Joaquin Valley on the east. There is a so-called winter and summer, but the roses bloom in gardens through both of these seasons with an equal beauty. It has a wet season and a dry season, the former a succession of showery days, alternating with days of fair weather and brilliant sunshine. The dry season is not so dry as to blight the foliage of such trees and shrubs as require moisture for their subsistence.

The tops of the surrounding mountains are whitened with snow every winter, but the winds come into the valley from the north, and not from the mountains, so that these snowy ridges do not chill the air. Since the advent of the white man into the valley, snow has fallen but twice, and then melted on the same day. The temperature varies from 50° in the wet season to 80° in the dry. On rare occasions the thermometer may show a little higher temperature during the warm months. The summer is as free from heat as the winter is from cold. The self-same breeze from the bay that cools the air in summer warms it in winter, drawing its own temperature from the unchanging ocean.

Along the slopes of the mountains on either side of the valley, at an elevation ranging from 600 to 2,000 feet, exists a region known as the thermal, or warm belt. When there is a heavy frost in the valley below during the night, there is no sign of frost on these elevated tracts of land. This anomalous distribution of heat is explained by the fact that during the day the lower strata of air in the valley becomes heated and gradually rises up en masse, its place being supplied by the cold air flowing in from the north, near the surface of the ground, that has been cooled by radiation during the long winter nights. Orange trees planted in these thermal belts, at an elevation of more than 2,000 feet, suffer little from the ravages of frost.

The rainy season lasts from October to April. In the latter part of September the signs of a coming change are apparent. The winds, which have hitherto come from the north, now become variable both as to direction and force, or perhaps wholly cease. The stillness of the night is broken by fitful gusts which, while wailing through the trees, are the precursors of the coming winter. In the first ten days of October about an inch of rain will fall, followed by weeks of the finest weather.

The effect of these first rains is magical. It washes the dust from the foliage, and the earth puts on the freshness of spring. While in the East the year is gently dying, here a new year is apparently springing into existence. If in this and the succeeding months there are further showers, the grass springs up on every hand, the hills change their subdued coloring for a lively green, and wild flowers appear in every sheltered nook. The flowers supposed to be coincident with spring bloom in the gardens, and the perfume of the violet scents the air. It is not till the end of November or the beginning of December that the rainy season is fully established. A coming storm is now heralded by a strong, steady wind, blowing for a day or two from the southeast, followed by several days of rain, and these succeeded by days and even weeks without a cloud. And so, for six months from the time of the first showers, occasional storms alternate with periods of fair weather. The amount of rain which falls during the winter varies with the locality, from 15 to 35 inches being a fair estimate throughout the valley. Taking an average of a series of years, it appears that of the 182 days which comprise the rainy season, on 43 days in each year more or less rain fell; 69 days were cloudy; the balance bright and pleasant. Thunder storms are practically unknown, the low rumbling being only occasionally heard on the mountains many miles distant. Severe wind storms and cyclones, so common in some of the interior States, are wholly unknown here, and as before stated, snow has but twice fallen since the advent of the white man.

With the month of March the rains are practically over, though agriculturists expect and hope for showers in April. May has perhaps a few showers during the first ten days, which interfere with the harvesting of the first hay crop, and then the dry or summer season is in full swing. By July the surface moisture has been taken up and dissipated, and the growth dependent upon it ceases. The nutritious grasses have ripened, and self-cured and dried are the food of the cattle and sheep. The waving fields of golden grain await the reaper.

And such is the winter of Santa Clara Valley, so strangely unlike winter elsewhere, for here man has interposed. Here, by art and labor, he has reversed the processes of nature, and constrained the course of the seasons. In gardens bright with foliage and resplendent with flowers, there is spring with its freshness and beauty; while in orchards teeming with fruits, and vineyards purple with ripening grapes, summer and autumn vie with each other for supremacy. Those months that in the East preclude all farming operations, are here the season of the most activity, gathering crops and preparing the ground for new ones. With the rains of November plowing and seed-planting begin, and continue with but little delay until March. If the rains continue too late in the spring, the later sown fields generally produce cleaner crops and of superior quality, while without these later rains the earlier sown crops are the best.

For the fruit growers these seasons are even more advantageous than to the farmer. No humidity or moisture for months to nourish the weeds which in other localities overrun orchards to the detriment of the fruit trees. In sections where there are constant showers, the utmost endeavors of the orchardists could not effectually keep the weeds under. Here the weeds germinate during the rainy winter months, are plowed under at the first plowing, and the surface of the ground drying to a depth of three or four inches at the commencement of summer, and so remaining during the entire season, it is impossible for seeds to germinate or plants to live. Any one who has attempted to start seeds in summer knows how necessary, in fact how indispensable, moisture is for their growth, and can appreciate the effectiveness with which the climate coöperates with the fruit grower in preserving all the moisture in the soil for the trees and vines. Thousands of acres of orchards without a weed, and the only labor to produce this result, one turning over with the plow in the early summer, is a marvel to the visitor, and a climatic condition fully appreciated by the resident.

Santa Clara is preëminently the horticultural county of the State. Every variety of fruit grown in California is produced here, but the chief of all the horticultural pursuits of the county is prune growing. Of the prune crop of California Santa Clara County produces nearly nine tenths; more than one half of all the prune trees in America are growing in this county. Last year's output of prunes in Santa Clara was over 22,000,000 pounds, and as yet but a small part, not over one third, of the orchards are in full bearing.

With improved facilities for marketing, this latest industry has, within the last ten years, assumed marvelous proportions. The largest fruit canneries in the world are operated at San José, the leading city.

Santa Clara Valley is not a citrus-fruit country, although oranges, lemons, and limes have been successfully raised, and from time to time creditable displays of these fruits have been made. She finds greater profits, quicker returns, and a much wider market for the deciduous fruits, and her prunes, peaches, pears, cherries, apricots, nectarines, figs, plums, apples, grapes, berries (fresh, canned, dried, and glazed), her olives and olive oil, almond and walnuts, wines and brandies, are famous the world over.

The following, from the pen of W. H. Wright, gives a very excellent review of the fruit industry of Santa Clara County:

"The fruit industry began with the planting of orchards at the Mission San José. What were the varieties of the fruits planted by the Fathers it is not now possible to ascertain in detail. Vancouver says that he saw, on his visit in 1792, peaches, apples, pears, apricots, figs, and vines, all of which, except the latter, promised to succeed well.

"This Mission orchard was the only source of fruit supply to the valley for many years, and for some time after the American occupation it held a prominent position. It was claimed as a part of the public domain when California was ceded to the United States, and was taken possession of by J. W. Redman. It proved a bonanza, the fruit selling for 50 cents per pound, while the yield was enormous. Some of the old trees are yet vigorous, although neglected for years, and a prey to all the pests that have been known to Santa Clara County orchards."

The scarcity of fruit and the consequent high prices gave a stimulus to horticulture. Apples imported into San Francisco sold at retail for $1 apiece, and other fruits in proportion. People thought that at half these prices there would be more money in a bearing orchard than in the richest gold mine discovered. The idea struck many at the same time, and many orchards were planted, principally of apples and pears.

In 1852 three large orchards were planted by E. W. Case, William Daniels, and Joseph Aram. Some of these old trees are still flourishing. Among them is an apricot tree on the Hobson place, formerly a part of Captain Aram's orchard, which is now thirty-six years old, a vigorous bearer, and a living contradiction to the statement that fruit trees in California are short lived.

In the spring of 1852 Commodore Stockton imported a large number of trees from Massachusetts for the purpose of establishing a nursery. The trees consisted of apples, peaches, pears, plums, nectarines, and apricots. With this importation came also the first strawberries grown in the valley.

During 1856 a horticultural fair was held in San José, and from this the reputation of Santa Clara fruit spread, and people came hundreds of miles to see it. In 1856 nearly all these early orchards had commenced to bear, and the quality of the fruit, and the promise of extraordinary productions, gave these pioneer orchardists an idea of the resources of the climate and soil in this direction. Everything they had planted prospered beyond their most sanguine expectations, and they were rapidly approaching the conviction that nothing could fail in Santa Clara Valley.

Being in this frame of mind they were ready to experiment in any direction, and that year stands out prominent as the date of introduction of the prune to this county, and in fact to this coast. The fruit has become a standard, and will probably always remain a favorite with our orchardists.

In 1868 the fruit interests of Santa Clara County received a heavy blow. The planting had heretofore been principally of apples and pears, and that year the yield was so great that the market was more than glutted. The influence of this experience was long felt, but it had its good effect, for it resulted in the planting of other varieties of fruits, and the adaptability of the soil and climate to them was soon apparent. Large orchards of cherries, apricots, and plums were planted, and fields of berries set out, and the infinite variety now grown always gives assurance of a ready market.

Heretofore the canning and drying of fruit in the valley was unknown. The want of some method for preserving fruit so that it could be readily shipped was felt, and this need was supplied by Dr. James M. Dawson, who had heretofore been unidentified with the fruit interests. In 1871 he put up the first canned fruit for the market. The first season's pack consisted of 350 cases of fruits and tomatoes, and the experimental effort proved entirely satisfactory. The company of which this was the inception now has a plant worth $100,000, and during the busy season gives employment to over 500 hands.

The industry of drying fruit started up almost simultaneously with that of canning. The majority of the large orchardists commenced drying their own fruit, and the prices obtained were so good, and the result of the experiment as a whole so remarkable, that the practice was continued. Companies were formed and plants were established for this purpose alone, until now a vast amount of capital and energy is invested in this industry.

According to the figures compiled from the last statement of County Assessor Spitzer, the land of this county is divided into the following holdings: Thirteen hundred and sixty-eight tracts of 10 acres or less; 1,448 tracts of from 10 to 40 acres; 252 tracts of from 40 to 60 acres; 588 tracts of from 60 to 100 acres; 563 tracts of from 100 to 160 acres; 307 tracts of from 160 to 240 acres; 209 tracts of from 240 to 320 acres; 169 tracts of from 320 to 400 acres, and 309 tracts in excess of 400 acres.

For 1889 the statistics were:

Number of acres sown for the crop of 1888: Wheat, 17,240; barley, 20,370; oats, 115; corn, 185; hay, 32,820.

Acres of grapevines planted: One-year old, 235; two-year old, 765; three-year old, 1,530; four-year old, 2,340; five-year old and upwards, 6,505; total, 11,375.

Small fruits: Strawberries, 410 acres; blackberries, 87 acres; raspberries, 35 acres.

Number of fruit trees planted: One-year old, 184,815; two-year old, 116,485; three-year old, 128,365; four-year old, 233,660; five-year old and upwards, 927,535; total, 1,590,830.

Number of nut-bearing trees, 15,920.

Number of ornamental trees, 2,370.

Assessed value of fruit trees: One-year old, $34,965; two-year old. $36,945; three-year old, $51,345; four-year old, $116,850; five-year old and upwards, $927,535; total assessed valuation of trees, $1,167,640.

Assessed valuation of grapevines: One-year old, $2,350; two-year old,

$11,475; three-year old, $30,600; four-year old, $58,500; five-year old, $325,250; total assessed valuation, $428,175.

The statistics of 1890 show that 15,950 acres were planted to wheat, 174 acres to oats, 18,550 acres to barley, 328 acres to corn, and 37,150 acres to hay.

The total number of fruit trees growing in 1890 was 1,807,434.

The total acreage planted to grapes was 11,560, of which 1,015 acres were in table grapes, 900 acres in raisin grapes, and 9,645 acres in wine grapes.

The acreage in berries in the same year was: Strawberries, 215 acres; blackberries, 47 acres, and raspberries, 25 acres.

The acreage sown to grain for the crop of 1891, is as follows: Wheat, 16,300; oats, 140; barley, 17,820; corn, 379; hay, 35,178; potatoes, 345; tomatoes, 520.

The following table gives the number of bearing and non-bearing fruit trees growing in the spring of 1891:

	Bearing.	Non-Bearing.
Apple	49,580	18,965
Apricot	216,265	14,202
Cherry	68,835	47,920
Fig	560	615
Olive	5,520	6,875
Peach	238,590	280,575
Pear	59,122	29,070
Prune	446,959	394,030
Orange	920	415
Walnut	715	655
Almond	9,200	8,420
Totals	1,096,266	927,742
Grand total		2,024,008

The acreage otherwise planted was: Grapes, non-bearing, 9,415; bearing, 2,205 acres; strawberries, 245 acres; blackberries, 61 acres; raspberries, 37 acres; gooseberries, 9 acres.

These figures speak for themselves, and by a close study of them one can gain some faint idea of the magnitude of the fruit interests of this county. By a careful comparison it will be noted that the area planted to grain is continually decreasing, while the fruit and vine acreage is increasing in proportion, showing, what is almost unnecessary to state, that vineyards and orchards are being constantly set out.

Progressive diminution is shown in the number of fruit trees set out from 1885 to 1888. In the former year, 233,660 trees were planted. In 1886 but 128,365 were set out, while in the following year the number dropped to 116,485, or less than half the planting of the season of 1885. The number, however, increased in 1888 to 184,815 trees, and in 1890 the immense number of 529,140 trees were planted—about double the amount of any previous year.

This fluctuation is due to the fact that up to 1887 evaporated fruit brought 50 per cent more in the Eastern market than sun-dried fruit, and the yield of the orchards of Santa Clara County in 1886 had been more than evaporators could handle. This led to a belief that the market had been overstocked, and, consequently, but little effort was made to increase the supply. In 1887, however, there was a very large harvest, and the orchardists were compelled to resort to the sun-drying process, and to ship the products thus cured to the East. To the surprise of the dealers it was found that fruit dried in the sun of Santa Clara County was superior to that dried by machinery. The price of such fruit immediately rose, and a new stimulus was given to the cultivation of orchards.

The effect of this was shown in the planting of 1888, 1889, and 1890. The number of trees set out in these years was limited solely by the supply. Unfortunately, that supply was not what it should have been. The nurserymen, not anticipating the reaction which came as soon as the success of sun-dried fruit in the Eastern market was assured, had made no provision for the increased demand. The prices of young trees rose rapidly. In 1885 trees had been sold on an average of from $10 to $15 per 100. In 1888 they brought from $35 to $40 per 100. The orchardists purchased them, however, at any price. They not only exhausted the supply in the county, but brought large numbers of trees from other parts of the State and from Oregon, and even imported thousands from Europe. Had the trees been available the plantings of 1888 would have been 75 per cent greater than they were.

Splendid prices were secured in 1890, and this led to the large increase in orchard acreage. Taught by the experience of the past, and the control of the market now being assured to the fruit products of the county, the nurserymen are preparing fully for the coming season.

The prices of 1891 were not up to those of the preceding year, but the profits, nevertheless, were good, and the orchardists are making great preparations for big plantings. Many of them are providing their own young trees, and the supply for the future promises to fully equal the demand. As it takes two years for a young tree to grow into sufficient size for orchard planting, the effects of these preparations will not be fully felt this year, but in the coming season the number of trees set out will probably equal if not surpass the plantings of 1890. In but a few years the probability is that the acreage of orchard lands will extend over the entire Santa Clara Valley and far up on the mountain sides, and this valley will be one vast expanse of orchards loaded down with the golden fruits which have proved more profitable and brought in greater riches than the biggest bonanza discovered in the golden days of the mining excitement. It is a wealth, also, that is inexhaustible, and does not decrease. It is continually augmenting, and will augment for years and years to come. It is wealth of which every one may partake. He who owns a few acres of good fruit land in this county has an assured competency for life, and is one of the most independent men on God's footstool. He is indeed to be envied, for there is not in the world a freer man.

Parker Earl, President of the American Horticultural Society, in an address delivered during a meeting of the association in San José in 1888, said: "The business of fruit growing is one of the noblest occupations of the world if carried on with a faithful spirit. The results of our work contribute directly and powerfully to the betterment of mankind. We minister to the health and moral status of the community. I would have every horticulturist regard his vocation with becoming pride. We work with the great forces of nature. We form alliances with the sunshine and rain, and the secret affinities of the soil. We manipulate the occult energies of chemistry. We join hands with Providence to produce our harvests. The American fruit grower, like the American farmer, should hold his head proudly, but reverently, as the best of the world. As I look at it, there is no man on earth that outranks the well-equipped and competent American farmer and American fruit farmer. But equipment of knowledge and intellectual competency means a great deal."

Reference was made in the preceding section to the fact that fruit dried in the sun in Santa Clara County is superior in appearance and in quality to fruit dried by machinery. This deserves a more extended notice than could be given to it in that place, where it was stated only to explain the fluctuations in the number of fruit trees planted during the season of the five preceding years. It constitutes, in fact, one of the most important advantages which Santa Clara County has over all other localities as a fruit-producing district, and as such it merits the consideration of every one who proposes engaging in that industry, or who desires to appraise rightly the economic value of the climate.

The worth of sun-dried fruit depends upon the conditions of the climate in which it is dried. In moist climates, or in lands where there are frequent showers during the season of drying, fruit cured in the open air is comparatively valueless. The air of Santa Clara County, however, during the whole of the harvest season, is free from moisture, the barometer registering a very low degree of humidity. In fact, so dry is the atmosphere that fruit has been perfectly cured in the shade by subjecting it to a draft of cold air. It is this dryness of climate which gives the sun-dried fruit of the county its preëminence in the market. The fact itself is beyond contradiction. Prior to 1887 sun-dried fruit in the Eastern market was rated at about 50 per cent less than that cured by machinery. This rating was due to the comparative merits of sun-dried fruits as were known to the East, where the climatic conditions are such that fruit cured in the open air is neither of a good quality as regards flavor and nutriment, nor of a good appearance as regards color and form. When, however, the fruit of Santa Clara County, dried in the sun, was shown them, it immediately caused a change in the rating, and took precedence in price of all other kinds of dried fruit. Prior to that year efforts were made to have the prune crop of California cured after the French method. It was said that only by adopting this method of curing could our prunes compete successfully with those imported from France.

Many prune growers did adopt that system, which consists in partly cooking the prune while preparing it; but others found it impossible to do so, and sent their sun-dried prunes to stand on their merits in the market. It was soon seen that the sun-dried fruit had more nutriment and a better flavor than that prepared by machinery. Much of these are lost in the cooking process of the French system of curing, while the sun simply takes the water from the prune, leaving all the rich juices unimpaired in taste and quantity. As a result of this competition, California fruit commanded in the Chicago market last season from 1 to 3 cents a pound more than the French prunes; and while this is largely due to the superiority of the fruit itself, yet it demonstrates that fruit cured in the open air, by the cheap process of the sun, in Santa Clara County, need fear no competition with fruits which, in localities less favored by climatic conditions, require for their proper preservation to be cured by machinery.

This confers a double advantage on the fruit growers of the county. In the first place, it enables much larger crops to be prepared for the market than would be possible if the fruit had to pass through evaporators; and in the second place, as the sun and climate are free to all, it gives the orchardist of small means the same facilities for drying his fruit as are possessed by richer men, who from the extent of their orchards and their wealth are able to have evaporators of their own. Nor are these advantages of slight monetary value. During the past season green apricots sold in Santa Clara County for $25 a ton, while the dried fruit brought from 10 to 12 cents a pound, or about $200 per ton. As it takes five tons of green fruit to make one ton when dried, this leaves a profit of $75 a ton over what is received for the green fruit. The cost of drying in the sun does not exceed $6 a ton, the only expense being for the sulphur box and the trays. The difference in prices between the green and dried fruit will, in a single year, yield a profit sufficient to pay for the whole plant needed for sun-drying. This being the case, nearly all the evaporators in the county are now laid aside and are used only in emergencies where rapid drying is necessary.

Prune growing is the largest, and taking one season with another, is the most profitable fruit industry in the county. The prune, like the grape, grows with equal luxuriance in the valley and on the foothills, and fully one half of the whole area of the county is suitable for its production. There is no fruit in the world so easily cultivated, so readily handled, so conveniently prepared for the market, and so remunerative as the prune, when cultivated in a soil and climate suited for it. In these respects Santa Clara County cannot be excelled, either on the eastern or western hemispheres, as here is the only place where it grows and ripens to perfection. Being thus, it constitutes a bonanza for this county, and is a never-failing source of wealth.

A feeling that packing prunes must be done under Government inspection is beginning to prevail. All acknowledge the impossibility of getting uniform grades by the present process. For instance, one man may, by extra care, get a high grade and get a corresponding price. Having created a demand for first-class goods, he cannot supply it from his small orchard. The careless packer interposes his stock, gets a price based on the other's good article, and works him a final injury. There are too many in all the departments of fruit business that force poor goods on the market, injuring the general trade.

Olive growing is destined to become one of the greatest, if not the greatest industry of Santa Clara County, and as such merits an extended description. There are as yet few who realize the value and advantages of an olive orchard, but the people are coming to understand them, as attested by the numerous trees set out during the past five years, and especially during the twelve months just completed. It is only a question of a few years when the olive orchards of the county will rank in extent with those of the prune, the apricot, and the vine.

The Mission olive was among the first of trees that were introduced into California. It was brought here from San Blas, Mexico, by Don Joseph de Galvez, during an expedition to rediscover the port of Monterey. The first planted in this county were at Santa Clara, January 18, 1877.

Next after the prune, the apricot is the largest orchard industry in the county, and is immensely profitable. Apricots were first planted in the county at the old Mission of San José, in the days long before an American set foot in the valley. They thrive mightily, and in the early days were noted over the length and breadth of the State for their large size and sweet lusciousness. But few trees of this variety were ever planted by Americans until 1858, when a large orchard was planted in The Willows, on the Zarilla tract, a large portion of which were apricots. These showed that this valley contained the proper soil and climate for the fruit, but the planting of apricots was small until it was demonstrated by D. C. Vestal what excellent ones could be grown there. In 1869 Mr. Vestal set out three acres of Moorpark apricots. The size and flavor of the fruit was so pleasing that the Moorpark came into universal favor, and the years following many extensive orchards were planted. Mr. Vestal has one tree on his place which is thirty-six years old, and has failed in its crop only three times since it came into bearing. This is remarkable, for anywhere outside of this valley the Moorpark is a shy and irregular bearer. The fruit is always in demand, and the demand is constantly increasing as the consumers become acquainted with its deliciousness. The fruit nowhere grows to such perfection as in this valley, and the work of canning it is one of the chief industries of the valley. Either dried or canned it is beyond comparison as a table fruit. It is easily and cheaply dried in the sun, and when thus preserved brings from 10 to 12 cents per pound, so that with but very little trouble, the growers can greatly increase their profits. Many of them do this, while others sell the fruit on the trees to the canneries, and thus save all bother. The apricots of this county reach a perfection unattained elsewhere, and are almost without competition. They frequently grow from 6 to 9 inches in circumference, and it is difficult to see how their flavor could be improved.

Peach growing is another of the industries for which this valley is famed, and justly so, for here this delicious fruit has an added deliciousness and flavor not found elsewhere. It ranks with apricot-growing in point of extensiveness and pecuniary remuneration.

This was also one of the fruits planted by the early Mission fathers, and peaches from their orchards sold in San Francisco for a dollar each in the early days. After the disastrous season of 1868, for apples and pears, the attention of orchardists was more particularly attracted to other fruits, and in the heavy plantings of succeeding years the peach was largely a favorite. This county now contains some of the largest peach orchards in the State.

All the favorite varieties of this delicious fruit ripen here into the full perfection of sweetness and flavor. The soil and climate are peculiarly adapted to it, and it thrives both in the valley and upon the foothills. The tree here grows to an old age, full of vigor and life, not having to endure the cold winters and other causes which, in the East, make it necessary to renew peach trees every four or five years. Trees here of the age of 30 years are not unusual nor infrequent, and they have grown full crops every season since they came into bearing. The shoots upon some of them are still 10 feet in length, fully demonstrating that there is still plenty of life in the old trunks, and they will further enrich their owners before going on the superannuated list.

Three years after planting the trees yielded a good crop, and thereafter their capacity for bearing was only limited by their ability to maintain the weight of fruit. Some trees have come into bearing at two years, but this is unusual and but seldom the case. In every orchard props have to be used, and in numerous cases trees break down every year from the immense weight of fruit. Proper pruning and care will obviate this. It is usual for orchardists to thin out the fruit shortly after it has formed on the branches. Though the number of peaches then obtained is less, this is more than compensated for by the larger size and more exquisite flavor of those remaining.

Their splendid appearance, large size, and unexcelled flavor have given them an enviable reputation, and the demand is always good and steady.

Santa Clara peaches in the green state find a ready sale in San Francisco and the East. Variety after variety succeeds, and ripe peaches may be had until late in November.

Plum growing is not as extensive as some of the other fruits. In any other spot it would be considered highly profitable, but the enormous profits yielded by other fruits overshadow the more modest income from this branch of the fruit industry. It pays well, however, and by giving a variety to the orchardist, assures him a crop when his peaches or apricots chance to have an off year.

Quinces are but sparingly grown in this valley, there being comparatively so little profit to orchardists in growing such fruit, because of the lack of a steady market. Yet this valley can and does produce quinces of the very best quality. The tree is a good grower and produces fruit in abundance. Wherever planted the trees have thriven mightily, and the fruit has been large and of fine flavor. The fruit is chiefly cultivated in family orchards for home use, and also by those who wish to have the largest possible variety of fruits.

On account of the extra labor in preserving, the canneries do not use the fruit at present, and even in its green state there is very little demand for it in the market. Some of the canneries intend soon to make preparations for using it, putting it up in the form of jelly and preserves.

When such is done quince growing will be immensely profitable, for the trees bear heavily, are long lived, and require little or comparatively no care. It grows equally well in the valley and on the foothills, and is in every way a desirable fruit for the orchardist to cultivate.

Almond culture is an industry which is certain in the near future to be extensively followed in this county, and the crops now obtained are highly profitable. In no portion of the State have these trees grown so thriftily or yielded so well as in that portion of the valley lying along the western foothills around Saratoga and Los Gatos. In this section the nut reaches a perfection of size and flavor that is not equaled anywhere else, much less excelled.

In 1873 a large almond orchard was planted, covering all the land upon which now stands the city of Los Gatos. This land then was considered of but little account, and the success of the experiment was far beyond the most sanguine expectations of the planters. At the present time nearly 1,000 acres are planted in almonds in this county. They form a part of almost every orchard.

Apple culture in this county is not what it should be, nor what it surely will be. When the adaptation of the soil and climate of the valley for fruit was first seen by the early Americans, large orchards were planted, and the majority of these were apples. In 1868 apple culture received a disastrous blow. The market was glutted, and the major portion of this fruit rotted under the trees. Also about the same time it was demonstrated that other fruits could be grown more profitably in the rich lands of the valley, and the result was that most of the apple orchards were dug up or other fruits grafted to the stock.

The apple does not thrive on the rich lands and in the warm levels of the valley in such a manner as to be profitable. The tree grows well, and the crop is enormous in quantity, but the quality is not so good as is desirable. Experiment has shown, however, that the foothill region, the higher foothills, and much of the mountains, are admirably adapted to the apple, and that as fine fruit of that kind can be raised there as anywhere in the world.

Pears are one of the chief glories, among the many which this county boasts, in the fruit line. They were the first of California fruits that were shipped to the East, and their exceedingly large size and unusually delicious flavor created the greatest astonishment and admiration. The fruit created a special market of its own, and has continued foremost ever since. California pears have no rival as a fresh fruit, canned, or dried, and the demand far exceeds the supply.

All the choice varieties in the world have been transplanted to Santa Clara County, and our enterprising horticulturists have originated many more. Many of the best pears now in the market were first grown there, and several of them have been transplanted to the orchards of the East. The fruits need a moist soil and can be grown in any part of the county, but thrives best in the Santa Cruz Mountains, where they attain to enormous size.

The fruit is readily marketed; large quantities are shipped East, where they are in great demand, but the canning companies take up far the largest portion of the crop. The fruit, as grown here, is particularly adapted to shipment. Being grown on vigorous trees in a fertile soil, and in a climate free from moisture, they will keep in good condition and retain their flavor for several months. Pears from Santa Clara County stood on the tables of the New Orleans Exposition during the entire exposition without having to be renewed and without losing their bloom and plumpness. The pear tree begins to bear in the third year, and in the fourth will pay for the cost of cultivation. It is not until the sixth or seventh year, however, that they are in full bearing. The finer fruit is in very great demand, and sometimes it brings as much as 5 cents a pound. R. D. Fox in one season sold the fruit from 150 Easter Beurré pear trees for $1,500.

The Bartlett pear belongs to the choicest fruit that is grown, and reaches its greatest perfection in certain sections of the valley. They require a moist, rich soil, and thrive on land adapted to no other kind of fruit. A thousand boxes of pears to the acre is not a large yield, and $1 a box, or 2½ cents a pound, is an average price. Other varieties are grown, viz.: The Winter Nelis, Beurré Hardy, etc., but the Bartlett is the best. There were plenty of Bartlett pears grown in this valley this year that weighed a pound and a half each.

Cherries are grown in the Santa Clara Valley on a large scale, and some of the profits yielded are almost beyond belief. The tree flourishes on every soil in the county, except that where water stands in the winter time.

Taking one year with another, there is no fruit that gives more satisfactory returns than the cherry. The best results have been gained on rich, not too light, valley land. Adobe is not so well suited to the cherry as a lighter, more friable soil. On the other hand, a soil containing too much sand or gravel is not good. In all respects the soil of "The Willows" peculiarly fits the cherry, and there it is perfectly prolific and yields the most lucrative crops. The fruit of the cherry tree attains, when ripe, to a size and flavor unknown in any other land, and every variety of black, red, and white grows with the same luxuriance and profusion.

Even in this glorious place, under the best conditions obtainable, the trees are slow in coming into bearing. A full crop cannot be expected until the trees are seven years old. However, it is then more profitable than either the apricot or prune.

With proper handling, cherries are one of the best shipping fruits. While many parts of the State produce good cherries, the area of land suitable for such is much less than for many other fruits, and none can equal those of the Santa Clara Valley, so that there is always a steady and profitable market for all our cherries.

The fruit is the first to ripen in the valley, and the harvest of the crop begins in May and continues for some months. As it brings in the first money of the year it is much favored by growers, and there are few orchards which do not contain a fair percentage of cherry trees. As a consequence the product of the county is very large, some single orchards shipping as much as 30 tons in a single season.

Fig culture is one of the oldest industries in the county, the trees having been planted by the Franciscan fathers at the Mission more than one hundred years ago. The trees thrive and have much fruit. They were originally planted more as shade and ornamental trees than anything else, but the perfection to which the fruit attained demonstrated that the conditions here were suitable to the culture of figs of the finest quality. The varieties first planted were not suitable for commerce, and so later plantings have been of the commercial varieties of Smyrna and the Adriatic. These have fruited in the most satisfactory manner. The crops are heavy, and the fruit is inferior to none in the world.

Citrus fruits have never been grown in Santa Clara Valley for the money there is in them, although fine qualities of fruit are produced. There is so much more money in other fruits that these are at present out of the question with growers. However, there is a considerable number of acres planted in them—taken altogether, enough to show that the valley could make a record in this line if it were necessary. In 1888 the National Horticultural Society held a convention in San José, during which a citrus fair was held. The display made was a remarkable one, and surprised even old residents of the county.

The berries all do well. The strawberry is especially prolific in the low lands near the bay. It gives immense yields, which always bring good prices. There was a time when the major portion of "The Willows" was planted to strawberries, but they found they could not compete with the growers in the low lands, for the latter, by artesian wells, secured water for irrigation without further trouble, while the others had to raise the water to the surface.

Fully 700 acres are planted to this berry. The vines are set out along the sides of the ridges between the irrigating ditches, and the center of the ridge is planted with onions, or some other small vegetables.

Blackberries are raised much in the same region as the strawberry, and about in the same way. Large quantities are canned annually, but greater portions find a ready and steady sale in San Francisco in a fresh state. The blackberries are not confined so much to the low lands. In the cañons and upon the sides of the mountains it grows prolifically and is an abundant bearer.

The raspberry is a delicious fruit, which grows to full perfection in this county. It is cultivated in almost every garden, and never fails to produce a large crop of berries each year. The raspberry is cultivated similarly to the blackberry, and thrives in the same localities.

Currants thrive remarkably well and yield good returns. Gooseberries are not so much cultivated, but when attention has been paid to them they do fairly well.

Nuts are not grown to any great extent. The English walnut, to which most attention has been paid, does well here. Other nuts, as the pecan, chestnut, and other varieties have been grown to a limited extent for ornament, experiment, or family use, and all seem to do well.

ACREAGE AND VARIETY OF FRUITS IN SANTA CLARA COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	500	250	750	72
Apricot	2,900	1,450	4,350	384
Cherry	850	400	1,250	120
Fig	12	8	20	2
Olive	90	45	135	15
Peach	3,458	2,112	5,570	70
Prune	5,000	3,000	8,000	425
Pear	600	300	900	120
Plum	575	325	900	74
Quince	40	....	40	....
Lemon	3	2	5	1
Orange	25	15	40	3
Nuts—Almond	130	70	200	20
Walnut	10	7	17	2
Raisins	200	....	200	....
Table grapes	1,200	....	1,200	....
Small fruits	360	....	360	....
Totals	15,953	7,984	23,937	1,309

SANTA CRUZ COUNTY.

Santa Cruz County fronts its entire length on the Pacific Ocean, and lies midway between Oregon on the north and Lower California on the south, and is in the heart of Central California. Its boundaries, besides the ocean on the west, are San Mateo on the north, Santa Clara on the east, and Monterey on the south. It is separated from San Mateo and Santa Clara Counties by the Santa Cruz Mountains, and from Monterey by the Pajaro River. It has an area of 437 square miles, or 280,000 acres.

It is the smallest county but one in the State, and comprises a narrow strip of mountainous land about 40 miles long and 18 broad, forming a vast amphitheater, and sloping from the summits of the Santa Cruz range, whose highest elevation, Loma Prieta, is 4,000 feet, southward and westward to the bay of Monterey.

The curving line of shore and the corresponding curve of the mountain line inclose an irregularly crescent-shaped tract of country, with an average width of 20 miles, which for grandeur, beauty, and variety of scenery equals any tract of similar size in the world.

The innumerable ridges and spurs of the Santa Cruz range are intersected and furrowed by gorges, cañons, and narrow valleys, trending for the most part seaward. The sides of these are closely set with forests of pine, redwood, madrona, and other trees, the redwoods having, in many cases, attained gigantic growth. A number of streams rise in these hills, and bring down with them the rich alluvial loam into the valleys, which, in their normal condition, are smiling with native grasses and flowers, and as soon as "tickled with a hoe" yield phenomenal agricultural results. These streams are, agriculturally as well as topographically, a very important feature of the county, watering as they do every section of land. Besides these larger streams, springs of water are almost innumerable.

Nearing the coast there are many interesting topographical features. The leagues of wide, high, wind-swept grassy plateaus which form our remarkable grazing and dairy lands; the succession of chalk terraces; the broad, amphitheatrical valley of the Pajaro; the salt lagunas, picturesque in configuration, and surrounded by park-like groves of live oaks; the high sandstone cliffs along the shore; the magnificent ocean drives—all material for pleasant investigation.

Along the coast-line (except in the northwestern corner of the county, at which point the mountains come down nearly to the water's edge) a series of raised beaches form a strip of more elevated land along the seashore. This widens to the south of the city of Santa Cruz, and affords a large area of fruitful soil, which has been brought into a high state of cultivation.

From Santa Cruz City southward the soil consists of a light loam, abounding in lime, potash, and phosphoric acid. In the Pajaro Valley a great variety of soil is found, from the rich sedimentary alluvial wash to the light sandy soil of the foothills. In the lower part of the valley a clayey loam predominates. This is followed by a heavy adobe higher up, and then the dark, reddish loam of the plains. The latter is the favorite with the fruit growers, and it is here that the best orchards are found.

Of the climate, the "Surf," published at Santa Cruz, says:

"The climate is acknowledged by all who have given it a trial, and who know other parts of the world, to be the most equable and invigorating known anywhere. The range of the mercury is from 28° to 88° above zero, with a difference of only 10° between the mean temperature of the three warmest and the three coldest months. The place is sheltered from north winds by the crescent-shaped range of mountains on the landward, while the milder breezes of the Pacific have free access. The proximity of the mountains gives an almost endless variation of elevation, exposure, and aspect, which are as favorable to the great industries of vine and fruit growing as to the preservation of health. The scenery of the entire county presents a greater variety of grandeur and beauty than any tract on the globe. Mountain and marine views, dense forests, gloomy gorges and cañons, sunny, flower-filled valleys, lakes and mountain streams are the more important features. That famous group of redwoods, the Big Trees, of which the largest one is 300 feet in height, 60 feet in circumference, and 109 feet from the ground to the first limb, is 5 miles from the city."

The following table, compiled by W. R. Springer, Observer for the Signal Service Bureau, for 1891, will give a good idea of the average climate of Santa Cruz:

	Jan.	Feb.	Mar.	April.	May.	June.
Highest barometer	30.37	30.39	30.20	30.23	30.10	30.14
Lowest barometer	29.86	29.20	29.90	29.75	29.79	29.80
Mean barometer	30.16	29.97	30.06	30.04	29.98	29.93
Range for month	.51	1.19	.30	.48	.31	.34
Greatest daily variation	.18	.52	.29	.20	.11	.11
Least daily variation	.00	.00	.00	.00	.00	.00
Highest temperature	68	62	72	78	73	92
Lowest temperature	28	30	34	36	42	42
Mean monthly temperature	49.25	47.1	55.4	54.4	56	62.3
Monthly variation of temperature	40	30	36	42	31	50
Greatest daily variation	29	26	29	35	28	38
Least daily variation	13	5	5	11	9	14
Coldest day of month	41.5	44.75	48	48.5	55	57
Hottest day of month	55	58	60	61	62.5	70
Highest humidity	78	86	83	78	82	78
Lowest humidity	35	44	39	50	58	48
Mean humidity	62.5	66.5	65	67	69.1	64.2
Cloudy days	2	10	7	7	6	1
Partly cloudy days	11	11	10	9	19	4
Clear days	18	7	14	14	6	25
Rainfall	.77	10.68	1.36	2.57	.60	.10

	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Highest barometer	30.08	30.10	30.12	30.22	30.37	30.50
Lowest barometer	29.84	29.87	29.83	29.84	30.05	29.77
Mean barometer	29.94	29.98	30.13	30.82	30.15	30.26
Range for month	.24	.23	.23	.38	.32	.82
Greatest daily variation	.10	.09	.10	.17	.17	.31
Least daily variation	.00	.00	.00	.00	.00	.02
Highest temperature	92	100	92	89	80	69
Lowest temperature	48	46	39	38	31	25
Mean monthly temperature	44	64.9	61.8	58.9	54.7	48
Monthly variation of temperature	44	54	53	51	49	44
Greatest daily variation	37	46	42	42	41	41
Least daily variation	14	15	19	8	9	10
Coldest day of month	59	59	55	53	40	36
Hottest day of month	71	70	68	64	63	56
Highest humidity	88	76	79	83	84	77
Lowest humidity	50	52	55	29	43	40
Mean humidity	68	66.2	70.7	64	62	60
Cloudy days	1	0	1	4	4	12
Partly cloudy days	13	12	6	8	15	15
Clear days	17	19	23	19	11	4
Rainfall	.00	.00	.70	.45	.58	7.60

While Santa Cruz is not in the foremost rank among the horticultural counties of the State, to it belongs the honor of being among the first to introduce that industry to California, a nursery having been established here as early as 1846 by A. A. Hicox, who brought cuttings across the plains carefully sealed in bottles. With these he grafted seedlings obtained from the old Mission orchard at Santa Cruz, and so became possessed of a large and profitable orchard. A few of the old trees yet remain on the old Hicox place at Santa Cruz and continue to bear good fruit.

Most fruits do well in Santa Cruz County, and especially in the Pajaro Valley. The apples of the mountains and Pajaro Valley rival anything in the Union. The crop is a sure one, and the yield exceptional. Ten boxes (50 pounds each) to a tree from orchards in full bearing is the average, while twenty boxes per tree is by no means exceptional. Prunes of the best varieties are largely cultivated, and the dried, evaporated, and canned products find ready sale. Olives, it is believed by many, will eventually take the lead, and large orchards are being added yearly. Mountain apricots are exceptionally fine. Cherries are immense in size, and fine in flavor and yield. Peaches, though not grown largely as a commercial product, are an adjunct to every orchard, while pears are phenomenal in size, and a most profitable crop. The English walnut and almond are growing in favor, and are largely cultivated. The citrus fruits are successfully cultivated for home use, but not commercially so far. The small fruits prove fortunes to their growers; 2,000 tons per year is the shipment of strawberries from the Pajaro Valley alone, and they are in the market nine or ten months in the year. Raspberries and blackberries are quite as successful.

Viticulture, both as to the growing of wine and table grapes, has easily taken a leading place. The conditions for the successful growth of the rarest and choicest table grapes, and for the production of the best light dry wines, are absolutely perfect. The table grape season is long; the vintage of Santa Cruz Black Hamburgs, Verdals, Flame Tokays, Muscats, and others continue through November and December, and they are found latest in San Francisco markets. Twenty-two tons to the acre of Verdals is the maximum yield, but not exceptional. Ten tons per acre is an average for all grapes. The wines of this county, especially claret and dry white wines, are making an enviable name, and the manufacture steadily increases.

The principal sections devoted to fruit in Santa Cruz are the Pajaro Valley and the Santa Cruz Mountains, and the varieties chiefly produced are apples, prunes, apricots, and peaches. In the valley apples, prunes, pears, and berries find the best conditions, while in the mountain section prunes and grapes are the favorites. A ready market for all the surplus fruit of this county is found in San Francisco, being generally sold in the orchard to jobbers, who pick and sack it for the market. Some fruit is exported from Santa Cruz direct to Japan, Mexico, and Arizona.

M. B. Tuttle, at Watsonville, reports having sold his entire crop last year at $100 per acre, on the trees. These are chiefly apples, and are eight years old:

	Acres.	Selling Price.
Apples	24	$3,500 00
Cherries	2	200 00
Apricots	7	325 00
Totals	33	$4,025 00

These prices were for fruit on the trees, the purchaser picking and packing the crop. The trees in this orchard are from four to ten years old.

Santa Cruz reports the present season's crop as averaging good. The apple crop was especially good, and other varieties fair. The inclement weather of last spring did not affect Santa Cruz to the same extent that it did the majority of the other counties of the State. One of the oldest nurseries in the State is located at Watsonville. The Pajaro Valley Nursery was established by J. A. Blackburn and James Waters in the year 1866, near the town of Watsonville, Santa Cruz County; 5 acres were planted in trees the first year, comprising a general assortment of fruit trees, mostly, though, of apple trees. Stocks and seedlings were at that time very difficult to be had, and what could not be grown there for the want of seed had to come from the East, or France, via the Isthmus, a long, tedious trip, passing through a tropical climate, which not only at times seriously injured the plants, but often killed them entirely. Another difficulty presented itself, which was to get buds and cions of the different varieties true to name. At these times little fault could be found with the prices at which trees sold, for they were about as follows (all trees had to be two years old): Apples, $30 per hundred; pears, cherries, and plums, $50 per hundred; peaches, $40 per hundred, etc. Monterey cypress, pine, and Italian cypress sold at the modest price of $1 to $1 25 each, such as are now sold for 15 and 20 cents each.

The business was conducted with varied success by Blackburn & Waters until the year 1875, when Mr. Waters bought out his partner, and shortly afterwards moved to another piece of land situated within the corporate limits of the town of Watsonville, where he continued the business until a year or so ago, when he bought a piece of land near the Pajaro depot, Monterey County, and now has closely planted in nursery 65 acres of trees. The land is the finest of the productive Pajaro Valley.

This nursery is devoted almost exclusively to the growing of fruit trees, comprising not only all the old and standard varieties, but also those of recent production which are found to be worthy of cultivation. The nature of the soil and climate in this valley is such that no irrigation is needed. It is a specialty of this nursery that all trees and plants are grown naturally without the use of water. The Pajaro Valley Nursery is one of the oldest in the State, and has been, from its first establishment, under the proprietorship of its founder.

In the Pajaro Valley a large area is devoted to berry culture, and small fruits do exceptionally well there. There are 75 acres of strawberries grown there, and on the Monterey side of the river 25 acres more. The acreage of small fruits is: Strawberries, 100 acres; blackberries, 129 acres; raspberries, 71 acres; total, 300 acres, all grown without irrigation.

ACREAGE AND VARIETY OF FRUITS IN SANTA CRUZ COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	719	900	1,619	300
Apricot	310	370	680	120
Cherry	159	181	340	50
Olive	4	120	124	3
Peach	351	421	772	100
Prune	917	1,065	1,982	320
Pear	194	139	333	57
Nuts—Walnut	3	10	13	5
Table grapes	1,253	----------	1,253	----------
Small fruits	260	----------	260	----------
Totals	4,181	3,206	7,376	955

The assessed value of trees in Santa Cruz County is $154,615.

In Laurel district fruit is not raised in any large quantity. The land is covered mostly with timber, and wood and lumber are the only exports.

The district comprises about 1,800 acres, of which not more than 100 acres are in fruit, and those are divided into small orchards and vineyards.

The soil and climate are very favorable for fruit growing, and grapes, peaches, apples, etc., thrive.

Many springs and creeks give an abundant water supply.

The few fruit trees in the district are, so far, perfectly healthy, no injurious insects having made their appearance.

SHASTA COUNTY.

Shasta County is situated at the head of the Sacramento Valley, between parallels of latitude 40° 20′ and 40° 15′ north, and longitude 120° 20′ and 123° west. It is bounded on the north by the counties of Siskiyou and Modoc, on the east by Lassen, on the south by Tehama, and on the west by Trinity. Its greatest length from east to west is 90 miles, and its greatest breadth from north to south is 60 miles. Its area is 3,765 square miles, or 2,500,000 acres.

The mountains of the Sierra Nevada and Coast Range cover a large portion of the county on all sides except the south. They are rugged and lofty, rising more than 5,000 feet above the sea. On the east there are four peaks of special prominence, that stretch far into the county from the Sierra, separated from each other by a space of from 10 to 12 miles. Lassen Peak has an altitude of 10,577 feet, and is timbered for two thirds of the way up; the others are bald, and usually covered with snow. Other peaks and buttes are numerous, and all indicate volcanic origin, as shown by extinct craters, cones, sulphur deposits, beds of lava, etc. Hot and boiling springs are also of frequent occurrence.

In the southern portion of the county is a foothill region, half circular in shape, forming the northern end of the Sacramento Valley proper, and embracing about 500,000 acres, the altitude of which is from 500 to 2,500 feet above the level of the sea. The southwestern portion of this foothill region is a succession of rounded hills, varying in height from 50 to 200 feet above the level of the sea. The central and southern portions consist of table-lands, varying in altitude from 500 to 700 feet above sea-level. It has many narrow valleys. From this section eastward there is a gradual ascent to the mountains, embracing the higher foothills of the Sierra.

Shasta is noted for the number and beauty of its streams. First in importance is the Sacramento River, flowing through the county north and south; all but 20 miles of its course in the county is through a rocky cañon. The McCloud River, bursting from Mount Shasta's side, rushes through the mountains of the north in a southerly direction and empties into the Pitt River. The most beautiful stream of the northeast is Fall River. In its meanderings it is 40 miles in length, and empties into Pitt River. Besides these larger streams there are a score of tributaries or creeks, while springs abound in the foothills and mountains. Among the minor streams are Hat Creek, Roaring River, Hatchet Creek, Montgomery Creek, and on the north, Squaw Creek, McCloud River, and the Little Sacramento. These three have many features in common. They take their rise in the highest mountains around Mount Shasta, flow south, are clear, very cold, and very rapid, each about 100 miles in length, and fall into the Pitt River within a distance of 15 miles. Below this point comes Clear Creek from the west, Churn Creek, Stillwater Creek, Cow Creek, and Butte Creek from the east, the last forming the boundary between Shasta and Tehama Counties on the east, as Cottonwood Creek does on the west. Cow Creek is a large creek, having many branches, all rising in the high Sierra. Battle Creek receives the waters from the west side of Lassen Butte, as does Hat Creek on the east side. These two creeks have sources close together; each is from 30 to 40 miles in length. The former empties into the Sacramento River, the latter falls into Pitt River 80 miles above, at an elevation of 2,500 feet. Besides these streams there are a great many others of smaller size. Numerous springs are found, and water in abundance for all needs exists.

The soil of the valleys is an alluvium, a rich sedimentary deposit, largely intermixed with disintegrated rock, and in some parts with a mixture of gravel. The usual color is a light red or reddish brown. The soil is very fertile, and is found excellent for plums, prunes, pears, figs, and small fruits. The mesa lands bordering the valleys are, as a rule, composed of a sandy loam, with a large percentage of clay, and carrying in many portions, especially in the higher parts, considerable gravel and bowlder. Fruit of nearly all kinds does well on these mesa lands. On the foothills is found a red loam or clay, very productive, and excellently adapted to the growth of berries. On the elevated plateaus of the north and northwest the soil varies from a black, sandy loam to a red loam or clay, while to the southwest the soil is generally adobe, found very productive of grain and rich in natural grasses.

Almost any desired climate may be found, from the semi-tropical to that in which the cold winter and short summer prevail. The rainy season, which begins in September, is the most delightful part of the year. It is perfectly clear and warm between rains. In the higher altitudes the climate varies. The general range of cold is about 90° above zero. Snow storms are frequent, but not heavy or of long duration. The ground never freezes more than an inch or two in depth. The foothills have an excellent climate, neither an extreme of heat nor of cold. In the valleys in the east and northeast portions of the county the seasons—summer and winter—are similar to those of the Eastern States, only less in the extremes of heat and cold. During June, July, and August the thermometer ranges from 70° to 102°, and it is pretty warm; but in December, January, and February it never goes lower than 18° above.

The following statement of average monthly rainfall, in inches, covers a period of five years, and was kept at Reeds Camp, on the Upper Sacramento: January, 12.400; February, 7.480; March, 11.454; April, 10.880; May, 3.750; June, 1.956; July, .066; August, none; September, .660; October, 6.106; November, 3.442; December, 13.590; yearly average, 71.784.

The table given below shows the average precipitation for the same period at different points in Shasta County:

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Delta	8.28	2.27	13.95	12.52	6.33	3.56	.12	.00	.05	7.69	4.62	4.09
Fort Crook	3.86	3.19	3.52	1.59	1.25	.57	.25	.02	.39	.97	2.81	5.10
Fort Reading	4.88	3.27	3.91	3.92	2.85	.13	.00	.06	.16	.69	3.20	5.78
Redding	8.04	4.88	5.35	3.25	1.53	.48	.06	.08	.46	3.01	4.07	5.46
Reeds Camp	12.40	7 48	11.45	10.88	3.75	1.95	.06	.00	.51	4.80	5.00	9.85

Irrigation is unnecessary for most crops in many portions of this county, as the rainfall is sufficient for all ordinary purposes. The rainy season begins, as a rule, in September, never later than October, and extends, at intervals of two or three weeks, from that time until the middle of the following June. During the entire time the ground is thoroughly saturated with moisture. This rainy period covers the whole of the growing season in California. At the end of the rainy season grains, grasses, etc., are ready for the harvest, and fruits, grapes, etc., are beginning to ripen. Now follows the dry season, embracing the months of July, August, and September. Under a cloudless sky crops are harvested and stored away, and fruits mature and acquire the delicious flavor for which they are noted. The dry season is just as much of a necessity as the wet, for only under these conditions can perfect grain and fruit be grown.

There are several important canals in Shasta used for irrigating and stock purposes, and a district has been organized in Happy Valley under the Wright law, covering 20,000 acres. Negotiations are pending for the purchase of existing ditches for this district, the company now owning the water offering it for $50,000. Existing canals, with their mileage and assessed value, are given below:

IRRIGATION WORKS IN SHASTA COUNTY.

Name.	Miles.	Value.
Bee Creek Ditch (irrigating)	15	$1,500 00
Clear Creek Ditch (mining)	40	5,000 00
Eagle Ditch (mining)	12	2,400 00
Taylor's Ditch (irrigating)	3	3,000 00
All other ditches (irrigating)		7,500 00
Totals	70	$19,400 00

While there are many old trees in Shasta County, and enough has been done experimentally to prove that, when she will, Shasta can take rank as a fruit county, but little has been done towards giving her commercial importance in this branch. At Wiser's place, 5 miles north of Redding, there are orange trees that are ten to fifteen years old, which have borne profitable crops for years.

During the past few years a number of orange trees have been planted in different portions of the county, and all have done well. Deciduous fruits do remarkably well wherever proper care has been given them. Among the fruits which grow in Shasta are peaches, pears, figs, nectarines, apricots, pomegranates, cherries, prunes, Japanese persimmons, almonds, walnuts, chestnuts, apples, plums, prunes, pears, and berries of all kinds. Of late years more attention has been given to fruit growing in Shasta than was formerely bestowed upon it, and it will not be long before she will take her proper rank among the horticultural counties of California. At Anderson some extensive orchards have been planted, and at that place is probably the largest apple tree in the State. It is on the Redding grant, and was planted in 1857. Its circumference 18 inches above the ground is 5 feet, and last year its owner, Mr. P. R. Tolten, gathered from it 3,000 pounds of fruit.

The preference of Shasta orchardists leads to peaches, prunes, apricots, figs, pears, olives, apples, and nectarines. The other deciduous fruits and some citrus fruits are grown, but not to any great extent. The principal markets for the green fruit of this section are found in Oregon, Washington, Idaho, and Montana. Last year Shasta shipped to Chicago 20 carloads of fruit, and this season fruit has been shipped in carload lots from Redding to Portland, Oregon.

For this season contracts were made for 31 cars to be forwarded to commission merchants, who sell on 7 per cent commission. This is the first year that fruit has been so handled in Shasta, but with the high prices ruling this year the experiment proved very satisfactory.

The chief fruit sections in order of importance are: Cottonwood Valley—prunes, almonds, peaches; Anderson—prunes, peaches, pears, and apples; Happy Valley—olives, peaches, prunes; Redding—peaches, prunes, pears, apples; Dry Creek—peaches and prunes. In all these sections other fruits are grown, but those mentioned predominate.

The larger part of the fruit crop of Shasta is dried and shipped in sacks, although much of the better quality was boxed this season, some of this bringing fancy prices, and some extra fine; boxed, seedless grapes, from Happy Valley, sold at 16 cents per pound in the Chicago market last season.

The present season's crop will range: peaches, below average; apricots, 75 per cent less; prunes and pears, 10 per cent less; apples, about average; all other fruits, average.

There has been some very extensive planting of new fruit in Shasta County during the past two years, and especially in the past season. This has been principally in the country adjacent to Happy Valley and Anderson. Of the new fruit, prunes predominate very largely, and almonds are next in favor.

Some old orchards are found in Shasta County. One is in existence at the Tower House, on the Weaverville road, that was planted in 1852. This consists of apples, pears, and walnuts, and the trees are still in good bearing. There is another orchard on the McMurray ranch, planted by Jonathan R. Gilbert in 1860, which is still in good bearing condition.

ACREAGE AND VARIETY OF FRUITS IN SHASTA COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	97		97	
Apricot	81	200	281	70
Cherry	12	14	26	3
Fig	8		8	
Olive	20	17	37	6
Peach	526	300	826	93
Nectarine	7	3	10	1
Prune	280	400	680	100
Pear	73	10	83	2
Plum	2	3	5	1
Quince	1		1	
Orange	6	20	26	5
Nuts—Almond	31	50	81	20
Totals	1,144	1,017	2,161	301

SIERRA COUNTY.

Sierra County is preëminently a mountain county. It is located wholly in the Sierra Nevada range of mountains, and has for its boundaries Plumas on the north, the State of Nevada on the east, Nevada County on the south, and Yuba on the west. It has an area of 781 square miles, or 500,000 acres. Of this 200 square miles may be described as foothill, and the remainder mountain. In elevation it ranges from 3,000 to 8,000 feet above ocean-level.

The face of the county is everywhere scarred by cañons, some of which have a depth of over 2,000 feet, and whose sides are very precipitous. The whole surface is very mountainous, and some of the highest mountains and ridges of the Sierra range are found within its limits. It is one of the best watered of the counties of the State, containing within its confines the north fork of the Yuba River, with its lesser forks and tributaries, the Feather River, and the Truckee River, the latter rising in the southeastern portion of the county, in Webber Lake. There are numerous lakes in the county. In the northern portion there are Bear, Spencer, Gold, Gray, Packer, Volcano, Young America, Upper Salmon, Lower Salmon, Upper Sardine, and Lower Sardine Lakes, and in the southeastern portion there are Webber, English, Eureka, and Meadow Lakes.

One of the peculiar topographical features of the county is the expansive valleys and lakes lying high up among the loftiest peaks of the Sierra. The lakes vary from one eighth of a mile to 3 or 4 miles in length, most of them circular in form, and considering their small size, remarkable for their great depth. Gold Lake is one of the most notable, having been the locality of a gold excitement as early as 1849. This lake, which is about 4 miles long and 2 miles wide, is the source of the middle fork of the Feather River. A great number of mountain springs and small streams are found throughout the county.

The most important body of land in the county is the Sierra Valley. This valley, which extends over the boundary line into Plumas County, is the largest, and for its size the most elevated of the Sierra valleys, being 5,000 feet above sea-level. It is 30 miles in length, 10 miles in width, and of a semi-circular shape.

Some years snow falls to the depth of 20 feet on the high ridges, and hardly a season passes without an unfortunate wanderer losing his way in the furious storms that visit these mountains, and very often meeting his death. In the towns, people are obliged sometimes to communicate with each other by means of tunnels through the snow banks. The quantity and long duration of the snow necessitates the use of snowshoes, and races on them are as popular an amusement in winter as tobogganing is with the Canadians. The racing ground is usually on a long slope, down which the contestants slide, sometimes at the fearful speed of a mile a minute. The shoes (Norwegian skate) consists of thin pine boards, turned up at the toe, 4 inches in width and 12 or 16 feet long. During the warm season the temperature in the middle of the day is rather high, averaging from 80° to 90° in the shade; but the nights, it is unnecessary to say, are always cool, occasionally chilly. The present annual snowfall is much less than in former years, due, in a measure, as scientists tell us, to the thinning out of the mountain forests.

The soil of the valleys is usually a deep, black loam, largely admixed with rich vegetable mold, the result of ages of forest growth.

Irrigation is resorted to in the Sierra Valley for the growth of most crops, and an abundance of water is found for that purpose. Of late years a large number of artesian wells have been bored, from which large flows of water are obtained, and this is used largely for irrigation purposes, for which they have been sunk. Their depth varies from 140 to 300 feet, and a large extent of land, otherwise worthless, has been brought under cultivation through them.

Writing of horticulture in Sierra County, S. B. Davidson, of Downieville, says:

"We are about 3,000 feet above sea-level, and upon river banks and cañons, with mountains on either side, 3,500 feet above us, whose tops are covered with scrub oaks, berries, acorns, scrub chestnuts, etc. Early spring and late frosts (usually partners in our mountains) destroy all fruits one year in four, hence orchards have not proved very profitable with us, except the *potato orchards;* these invariably pay profits and produce the finest potatoes in the world, but too far from the railroad. Nevertheless many fruits do well here, and the apples grown in the mountain regions are superior in flavor and keeping qualities to those produced elsewhere. Fine peaches, plums, and small fruits are grown in most of the mountain valleys, and berries do especially well. The Goodyear Bar district is capable of producing good fruits, but the amount produced exceeds the demand, as we are situated about 60 miles from a desirable market. The fruits that do the best with us are apples, cherries, pears, peaches, and prunes. Blackberries, strawberries, and raspberries are grown to a large extent."

Owing to its remoteness form railroads, its peculiar topographical features, and severe winter climate, Sierra cannot be ranked as a horticultural county, and fruit growing is rather incidental than commercial.

The chief fruits grown in Sierra County are apples, pears, peaches, and white cherries. These are either consumed by the growers or find a market among the neighbors, or in the mining towns in the same or adjoining vicinity. They are marketed usually in their green state, a very small amount being dried, and none at all canned. An estimate of the output of the different kinds of fruits for 1891 and 1892 is as follows:

	1891. Pounds.	1892. Pounds.
Apples	883,750	150,000
Apricots	4,500	----------
Pears	44,000	52,000
Almonds	400	----------
Walnuts	1,500	1,000
Cherries	10,000	4,000
Small fruits	20,000	18,000
Totals	964,150	225,000

Prices for fruit in Sierra County last season and this ranged as follows:

	1891.	1892.
Apples	1¼ to 2 cents.	2¼ cents.
Peaches	4 cents.	4 to 5 cents.
Pears	4 cents.	5 cents.
Cherries	10 cents.	10 cents.

These prices are received when sold from fruit wagons which run about the county.

The crop in this county this season is almost a total failure. There was a late frost so severe that the leaves were destroyed on the peach trees. It is remarkable that apples and pears escaped as well as they did.

The acreage in fruit in Sierra County is very limited, not exceeding 93 acres, of which about 5 acres were planted during the present season. What fruit is grown there is planted along the rivers near the Mountain House, Goodyear Bar, and Downieville. East of Downieville there are a few trees, but on account of the late frosts fruit raising is made impracticable. A few small fruits only are grown there.

ACREAGE AND VARIETY OF FRUITS IN SIERRA COUNTY.

Variety.	Acres—Bearing.
Apple	68
Apricot	2
Cherry	4
Peach	5
Pear	4
Plum	2
Nuts—Almond	1
Walnut	2
Small fruits	5
Total	93

SISKIYOU COUNTY.

Siskiyou County is one of the most northerly of the State, being bounded on the north by the Oregon State line; on the west its boundaries are Humboldt and Del Norte Counties, on the east Modoc County, and on the south Trinity and Shasta Counties. It has an area of 6,078 square miles, or 3,800,000 acres, of which 900 square miles are valley land, the greater part of the remainder being mountains.

It contains a large area of farming, mining, desert, swamp, and timber lands. The mining section comprises the western and southern sections; the agricultural district lies chiefly in the central portion of the county, while the grazing lands lie along the Oregon border.

Siskiyou is one of the most rugged of California counties. Here the two great ranges—the Sierra Nevada and the Coast Range—meet, forming the head of the great California valley, known in the north as the Sacramento and in the south as the San Joaquin. The Coast Range, under the local names of the Salmon and Siskiyou Mountains, are in the western part, while the outlying ranges of the Sierra Nevada are in the southeastern part of the county.

There are few regions of country more rugged and mountainous than that lying to the westward of Scott Valley. The whole wide landscape appears to have been formed by some mighty convulsion of the earth, that has thrown up numerous spurs or broken ranges of mountains to the height of from 7,000 to 9,000 feet, and piled them together in strange confusion. During the winter and early spring months they are covered with an immense fall of snow, that renders them a dreary and desolate waste, uninhabitable to man or beast. The snow, however, rapidly disappears under the bright, warm rays of the summer sun, and by the middle of July it is almost entirely gone, and valley, grove, and glen are robed in a mantle of verdure in which are mingled the choicest of wild flowers. Here and there, in the more elevated spots, the snow lingers in great banks throughout the season, but they only serve as refrigerators to lessen the otherwise oppressive heat of summer time.

In the southern portion of Siskiyou, standing at the head of the Sacramento Valley, rises Mount Shasta, the grandest peak in the State, whose famous height has made this portion of California remarkable to her travelers. Mount Shasta is a part of the Coast Range, and is between the two ranges, in the southern part of the county. The mount is 14,450 feet high, being perpetually hooded with snow. The valleys here are from 2,000 to 4,000 feet above the sea-level, the mountains all being among the highest in the United States. The Coast Range is, indeed, at its most picturesque in Siskiyou County, the summits being very unlike the rounded hills surrounding the bay of San Francisco, for they rise, with their rocky formations of granite and slate, into rugged and precipitous peaks. The Sierras also consist in great part, in Siskiyou, of rough and rugged buttes, much of the county thus comprising cañons, gorges, ravines, abrupt mountain walls, precipices, and sudden little valleys. Fortunately for the material interests of the county, this wild country is covered with magnificent forests of redwood, fir, and sugar pine, while the valleys and level lands along the rivers are all extremely fertile.

In the northeastern part of the county lie lava beds, although the "lava beds" proper, of local Indian depredation history, are across the State line to the north. All of the country, in fact, in this northeastern portion of the State, embracing Siskiyou, Modoc, and Lassen Counties, is a high plateau, part of which is called the Central Basin, having beds of lava divided by volcanic peaks. This plateau is from 3,500 to 4,000 feet above sea-level, having steep mountains rising still 10,000 feet higher. This whole table-land would seem to have been formed by some great volcanic overflow of a former period of history.

The principal river is the Klamath, which runs from the Klamath Lakes, at the Oregon boundary, across the country and down through portions of Del Norte and Humboldt Counties, its watershed extending from Mount Shasta and the Trinity range on the east, and the Siskiyou and Coast Range on the west, into which flows the Shasta, Scott, Trinity, and Salmon Rivers on the east side, and numerous small tributaries from both sides. The Sacramento River also rises in the southeastern portion of this county, near the headwaters of the Trinity, Scott, and Shasta Rivers. Most of the McCloud River, a tributary of the Sacramento, is also in the county. At the Oregon boundary, Little Klamath Lake, some 20 miles in length, is mostly in this county, connected by Link River with the Big Klamath Lake in Oregon, which is over 40 miles long.

The largest valleys in the county are the Scott, Big and Little Shasta, and Butte Creek Valleys. Scott Valley is the most fertile of any, and is 25 miles long by from 3 to 5 miles wide. Big Shasta Valley is still larger, but is used most extensively for stock raising, while Little Shasta is one of the richest farming sections of the coast, although not over half as large as those first named. Butte Creek Valley lies east of Little Shasta, and extends along the Oregon line from the high ridges of Klamath River to the famous lava beds. This valley has heretofore been used mainly as a stock range, but settlers are now coming in and taking up farms. Along Cottonwood and Willow Creeks good farms and orchards yield fair returns, and on the mountains surrounding good feed for stock is afforded, while the gulches are excellent places for planting vineyards. Strawberry Valley is south of Big Shasta, at the base of Mount Shasta, and is a splendid section for the production of superior mountain grass for dairying. Squaw Valley, on McCloud River, farther south, is also well adapted for this purpose. The traveler along the main thoroughfares of Little Shasta Valley is favorably impressed with the number of comfortable farm houses and immense grain and hay ranches to be seen on every hand. Little Shasta River supplies an abundance of water for irrigating the whole valley, and, as a result, the latter is beautiful to behold.

The soil of Siskiyou County differs greatly in different portions. In the valleys it consists largely of a deep, black loam, merging to a sharp granitic character in the foothills. The large amount of eruptive rock that covers the northeastern part of the State of California, and which has had its source, to a great extent, from Mounts Lassen and Shasta, extends over the north and east portions of Siskiyou County, covering an area of over thirty townships, known as the lava beds district. Mount Shasta itself is situated on the western boundary of this immense lava flow, near the southern boundary of the county, and rises out of the plain a solitary cone 14,450 feet high, forming a prominent and picturesque landmark; it is entirely volcanic.

Passing through the center of the county, coursing somewhat west of north, with a granitic axis, is the range of Scott Mountains, with Scott

Peak, 7,800 feet high, near to the boundary of Trinity County. This range is flanked by micaceous and other slates, greatly contorted, and traversed by quartz veins, dipping southwest. This granite extends northwest in a belt about 4 miles wide, where the Klamath River crosses it, 9 miles below the mouth of Scott River, and connects with the Siskiyou Mountains in the northwest corner of the county. The Siskiyou Mountains form the divide between Del Norte and this county, and are a rugged, granitic range towering up into separate peaks deeply furrowed. All the streams coming from the north show exclusively granitic bowlders, and evidences of heavy denudations are very apparent where the two counties adjoin the Oregon State line.

Along the southwest border the Salmon Mountains show a continuation of the auriferous slate formation coming up from the southeast, dipping to the west, and in this range we find some excellent quartz mining properties.

The climate is more like that of the Middle States, but not so severe in winter; the weather in summer is warm, with cool nights. The snow falls on the mountains to a great depth, and in the valleys from 12 to 30 inches, and remains on the ground from eight to ten weeks. At Fort Jones the mean annual temperature is 48.09°; the highest, 94°; the lowest, 4° below zero. The winter is mild, with but little frost, and the high altitude renders the summer delightful, with cool and pleasant evenings. The average temperature in winter is about 40°, and in summer about 65°. Siskiyou seldom has more than a few inches of snow in the valleys, which melts away in a day or two; but the high mountains are covered with considerable snow, which afford a good fountain for summer benefit, in supplying an abundance of water for mining and agricultural purposes.

Good crops of cereals are sure every season on both high and bottom land, with late spring rains and occasional summer showers, which render irrigation unnecessary during most years. Fruit and vegetables of a temperate climate also grow luxuriantly, and of the finest quality. The mountain meadows and hills also produce the most nutritious grasses for cattle, horses, and sheep, while all the various ravines and gulches are well adapted for gardening and vine growing by reason of their shelter among the hills.

The average precipitation by months at different points in Siskiyou County is shown by the following table, taken from a series of observations covering a period of ten years:

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Berryvale	3.67	2.00	5.94	3.90	0.30	.00	.00	3.48	1.09	3.48	3.32	5.09
Fort Jones	2.88	4.10	2.77	1.25	1.21	.69	.07	1.16	.14	1.16	2.99	4.90
Scott Valley	4.84	2.97	2.72	1.78	.93	.43	.20	1.25	.40	1.25	3.08	4.84
Yreka	4.38	2.16	1.82	1.53	1.03	.89	.30	1.15	.27	1.15	1.61	2.77

Irrigation on a large scale has heretofore never been attempted in the county, but a movement is on foot to form an irrigation district under the Wright law. Fifty thousand inches of water are to be taken from the upper part of the Klamath River, between Shovel Creek, about 6 miles south of the Oregon boundary, and the town of Keno, in Oregon.

The preliminary survey is being made for an irrigating canal 50 miles long, 50 feet wide, and 4 feet deep, which will cover 130,000 acres of choice farming lands in Shasta Valley and vicinity. The canal will in all probability be used also for floating down timber from what is said to be the finest belt of sugar and yellow pine in the county. While this movement is in its infancy, it is confidently expected by its promoters to become an accomplished fact within two years. The promoters of this great enterprise are men of large wealth and extensive landholders, whose names give assurance that their enterprise will meet with success.

Horticulture in Siskiyou County is as yet in its infancy. Until the advent of the railroad four years ago, there was no market to which the fruit could be shipped. Apples, pears, peaches, plums, and cherries all do well, and are of a size, quality, and flavor not to be excelled by any other mountain county in the State. Throughout the Scott Valley and Big and Little Shasta Valleys a large acreage of apples was set out last spring. One hundred and forty carloads of apples were shipped out of the county last season by the shipping houses of San Francisco, who made a business of buying up the entire apple crop of the county, generally buying them on the trees and sending experienced hands to pick and pack them for transportation to the forwarding establishments at Yreka and Gazelle, where they were sorted and repacked for shipment. Many of the shipments were made direct to Chicago, New York, and Boston. The Yellow Newtown Pippin, Winesap, Spitzenberg, Northern Spy, and Winter Pearmain, as well as the Baldwin, are the varieties which do the best. They are packed in boxes, each of which contains 45 pounds, loaded into the cars and then shipped to their destination in the East.

All along the Klamath River there are favored spots where are produced the finest varieties of apples, pears, peaches, plums, and cherries, while such small fruits as blackberries, strawberries, raspberries, gooseberries, and currants are produced in great abundance. That the fruit interests of Siskiyou County will vastly increase the wealth of the people is a foregone conclusion.

The chief sections in which orchards are found in Siskiyou are Scott Valley, Little Shasta Valley, Cottonwood, and along the Klamath River. Scott Valley is the best fruit section of the county, but as it is situated about 30 miles from railroad, but little of the output finds its way to market. The varieties in favor there are apples, pears, prunes, cherries, and the more hardy fruits generally. These are generally marketed green, all that are not consumed locally being shipped to San Francisco, Oregon, Washington, Montana, and Idaho. Some of the best apples which find their way to the San Francisco markets are those from Siskiyou County.

One of the oldest orchards in this county is that owned by R. Hayden, and which is called the "Callahan Ranch." It was planted in 1857 by Asa White. The kinds were apples, pears, and peaches, the trees having been shipped from Oregon.

The output of apples from Siskiyou in 1891 was over 8,000 boxes, and prices realized were 2 cents per pound, in boxes. The total output for the present season is not so good as that of last year, but the fruit is more perfect than last season's crop, and would probably bring as much in the market.

The principal planting done during the present year has been in the vicinity of Scott Valley and the Klamath River. There are about 300 acres in fruit along the Klamath River, of which 100 are composed of young trees.

Since the building of the railroad to Montague, and the completion of a branch line to Yreka, which was completed about five years since, a great impetus has been given to apple growing, and a number of orchards have been planted for commercial purposes. Prior to that period, the only orchards were small patches, planted around residences for family use.

Acreage and Variety of Fruits in Siskiyou County.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	739	473	1,212	103
Apricot	23	97	120	30
Cherry	12	10	22	5
Peach	43	70	113	20
Nectarine	6	2	8	1
Prune	12	18	30	5
Pear	13		13	
Plum	2	1	3	
Quince	7	2	9	1
Nuts—Almond	2	3	5	1
Walnut	1	1	2	
Table grapes	10		10	
Small fruits	25	12	37	8
Totals	895	689	1,584	174

SOLANO COUNTY.

Solano County has a position about midway between the northern and southern extremities of the State of California, and 22 miles north of San Francisco. Its boundaries are mainly natural, having the Rio de Los Putos (commonly called Putah Creek) on the north; the Sacramento River, Suisun and San Pablo Bays, and the straits of Carquinez on the south; the Sacramento River and Yolo County on the east, and San Pablo Bay, the summit divide of the Suscol Hills, and Blue Mountains on the west. It is not exactly square, but about 40 miles from north to south, and averaging almost as much east and west. It contains an area of 828 square miles, or 540,000 acres—100,000 of which are swamp and overflowed lands bordering on the Sacramento River, Suisun and San Pablo Bays. One third of this, perhaps, has undergone the process of reclamation, placing it among the most productive land of the State. These swamp lands border the Sacramento River in the southeasterly part of the county, and Suisun Bay on the south boundary, with San Pablo Bay on the southwest, and are overflowed a few inches in depth at ordinary high tides. In the southeastern portion of the county are the Montezuma Hills, rising from 50 to 300 feet above tidewater, and intersected by narrow ravines or hollows, the watershed having an easterly and southerly trend. The Townsend Hills, in the southwestern portion of the county, are of a similar character. Occupying about twelve sections of land are the Potrero Hills; and in Suisun Township, Robinson Island rises out of the tules, and contains about a quarter section of land. A very large portion of Solano County—at least two thirds of it—is valley land, the remainder being properly described as foothill. A spur of rolling hills extends from Vacaville nearly north to Putah Creek, averaging 3 miles in width, the slopes and smaller valleys of which have become noted for their early production of fruit and vegetables. On the west of these hills, and parallel to them, lies Pleasant Valley, extending to Putah Creek. The crest of the Vaca Mountains forms the boundary line between Napa and Solano Counties. These mountains reach their highest elevation at Blue Mountain, which is 2,000 feet above ocean-level.

The climatic conditions of Solano are very much like those of her sister counties, although varying much with location. The southern portion, lying on the bay, has many of the climatic features of San Francisco, modified greatly by its remoteness from the Pacific Ocean, while in the northern and eastern portions, situated farther inland, the Sacramento Valley climate is found. The summers here are long and the weather usually warm, sometimes hot. The winters are usually moderate, occasional frosty mornings are seen, and at rare intervals ice will form; but excepting on days when it is raining, the sky is clear and the weather pleasant. The following table of average monthly rainfall, covering a period of ten years, will give an accurate idea of the annual precipitation in Solano County:

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Benicia	2.92	2.21	2.33	1.48	.37	.17	.01	.01	.05	.54	1.42	3.20
Suisun	4.40	2.83	2.60	1.98	.63	.30	.00	.00	.28	.79	1.59	4.70
South Vallejo	3.04	2.12	2.18	2.02	.57	.23	.00	.00	.09	.70	1.24	2.36
Vacaville	5.40	3.67	3.55	3.49	1.71	.22	.00	.00	.21	.92	2.92	7.35

The soil varies from red gravel to black sandy loam, from barren patches of alkali to rich alluvium; in fact, within the borders of Solano all classes of soil may be found. That of the swamps and overflowed lands is largely composed of decayed vegetable matter, admixed with sedimentary deposits brought down from the uplands by streams. The soil in the greater part of the Sacramento Valley is a light sandy loam, especially adapted to tree growth.

In the trough of the Vaca Valley the soil varies from a sandy to a clayey loam, and sometimes to "adobe." In the heavier soils, and where the subsoil was of a clayey nature, during the winter of 1889-90 many trees, principally peach and apricot, were killed. This was especially the case when they were planted in hollows. Several fruit growers who suffered state that throughout the Vaca Valley fruit trees made both a spring and autumn growth, and that during the winter of 1889-90 the heavy rains set in while the trees were growing, and before the sap had receded from the tops. They are of the opinion that the excessive dilution of the sap occasioned fermentation in the vascular system and the tissues of the plants, resulting in their destruction.

Throughout the hilly land to the east and northeast of Ulattis Creek the soil varies from sandy to clayey, according to the character of the parent formation. Experience has proved that the heavier soils are the best for pears, and the more sandy for peaches and apricots. In wells dug in this district, which may be said to form the western boundary of Vaca Valley, the surface soil varies from 1 to 10 feet in depth, beneath which sandstone, interstratified with shale, has been penetrated in some instances to the depth of over 200 feet.

Solano County ranks among the leading horticultural counties of California, and during the past ten years has made wonderful strides in this direction. In climate and soil Solano seems eminently qualified for horticultural pursuits, and the earliness and superiority of her fruit products have given her not only a State but national reputation. It is in Solano County that the celebrated Vaca Valley is found, the fruit and vegetables from which ripen and find their way to market so much in advance of most sections of the State. This valley is about 12 miles long and 2 miles wide, and owes its advantage to elevation, location, and surroundings—the surrounding hills protecting it from chilling winds, and the slopes giving to it the full benefit of the spring sunshine, while the deep, rich, fertile soil gives all the required constituents for plant life. Of the 16,000 acres in fruit in this valley, the bulk is devoted to the peach, apricot, and grape. The pear, cherry, and prune are also favorite fruits, while oranges have done well. The income of the valley from fruit annually amounts in round numbers to $1,000,000. Trains leave daily during the season for the East loaded with fruits.

The extreme earliness with which fruits ripen in the Vaca and Pleasant Valleys is attested by the fact that cherries are shipped regularly by the first of April, and apricots early in May, with all other fruits proportionately early. Vegetables are grown, too, in large quantities, and find a ready sale in the San Francisco market because of their early maturity. The advantage which is thus derived is certainly very great, and the high prices received by the fruit growers in this section attest the esteem in which their products are held by the public, both in California and the East.

The following statement shows the season for shipments of various fruits and prices received for the same last year:

	Date of First Shipment.	Date of Last Shipment.	Opening Price—Per lb.	Closing Price—Per lb.
Cherries	April 30	June 6	20 cents	15 cents.
Apricots	May 7	July 12	25 cents	3½ cents.
Peaches	May 30	October 9	20 cents	4 cents.
Plums	June 11	August 31	2 cents	3 cents.
Grapes	July 19	December 10	9 cents	4 cents.
Pears	June 5	September 28	10 cents	4 cents.

Over the whole county are found numerous orchards of various kinds of fruits, all of which do remarkably well, and amply reward their owners for the labor expended upon them. Within a short distance from the towns of Suisun and Fairfield, between 3,000 and 4,000 acres of valley land have been set to fruit and nut-bearing trees. About fifty people are engaged in fruit growing in Suisun Township, and it is here that the celebrated orchard of A. T. Hatch is located. This comprises 774 acres in almonds, cherries, peaches, pears, plums, prunes, apricots, nectarines, figs, grapes, currants, and gooseberries.

The chief fruit sections of Solano County are Suisun, Vacaville, and Laguna, and the principal varieties of fruits grown there are apricots, peaches, pears, plums, prunes, and table grapes. Vaca Valley is renowned for its early productions of fruits, all varieties ripening there from ten days to three weeks earlier than in most other sections of the

State. On this account the land is very largely devoted to growing fruit, and especially for Eastern and San Francisco markets. A very large proportion of the fruit is shipped green for table use. In addition to that exported, very large quantities of fruit in Solano County are canned and dried.

The export of fruit from Solano last year was 1,034 cars, distributed as follows:

To the East—green fruit	514 cars.
To the East—dried fruit	261 cars.
To San Francisco—green fruit	249 cars.
To San Francisco—dried fruit	10 cars.
Dried fruit still on hand	50 cars.

The crop for the present season was not so heavy as that of last year, but many young orchards came into bearing, which largely compensated for the shortage. Prices have ruled so much higher in the past year that growers will not lose on account of the above-mentioned shortage. Since June of the present year up to August 3d of the present year, there were shipped from Suisun 164 carloads of fruit, of which 98 cars were shipped directly East, 6 cars going to Liverpool and 60 to San Francisco. Fruit for the Eastern market is packed in refrigerator cars, the pears being put in 40-pound boxes, peaches in 20-pound boxes, cherries in 10-pound boxes, prunes in 20-pound boxes, and grapes in crates of 10 and 20 pounds. Prices paid for fruit in Solano last year and this were as given below;

	1891.	1892.
Pears	2½c.	2½c.
Peaches	1½ to 2½c.	2 to 2½c.
Apricots	1 to 1¾c.	1¾c.
Plums	1 to 1¼c.	
Prunes	1¾c.	
Almonds	10½ to 15c.	
Cherries (per box)	92c.	

ACREAGE AND VARIETY OF FRUITS IN SOLANO COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	47	6	53	3
Apricot	2,533	1,200	3,733	300
Cherry	320	116	436	52
Fig	76	175	251	30
Olive	50	54	104	21
Peach	3,395	1,520	4,915	517
Nectarine	103	57	160	12
Prune	1,200	1,670	2,870	432
Pear	2,050	1,000	3,050	327
Lemon		8	8	
Orange	15	55	70	12
Nuts—Almond	930	540	1,470	160
Walnut	13	57	70	15
Raisins	1,328		1,328	
Table grapes	382		382	
Totals	12,442	6,458	18,900	1,881

SONOMA COUNTY.

Sonoma County is bounded on the south by San Pablo Bay and Marin County, on the east by Lake and Napa Counties, on the north by Mendocino County, and on the west by the Pacific Ocean. Its Napa, Mendocino, and Marin boundaries are straight, but its ocean boundary, of more than 65 miles, conforms to the irregularities of the shore. It has an area of 1,500 square miles, or 972,000 acres. On the bay shore it has a frontage of 20 miles.

There is no sameness in the surface of Sonoma County. Variety is a leading characteristic of every township. Valleys, and hills, and mountains appear to have been planned, and their distribution so ordered as to give the best effect. The great central valley, extending entirely across the county from south to north, and having a varying width of from 6 to 15 miles, commands attention by its area and remarkable fertility. The coast range of hills breaks the monotony of the landscape in that direction, while to the southeast Sonoma Mountain rises to the height of 2,400 feet, with Bennett Peak and Mounts Taylor and Hood farther north. Away to the northeast Geyser Peak has an elevation of 3,740 feet, and from its greater height, just beyond, St. Helena looks down upon the whole of Sonoma County. And these hills and mountains are not for ornament alone. High up on their fertile slopes, yes, even upon their very summits, are numbers of the finest homesteads in this county. The area on which rough stone is found to interfere with general farming operations is quite small. Out of the immense area of land in Sonoma County, at least 200,000 acres are valley land, the richest soil known, being a black loam; 200,000 acres are rolling or higher tableland, with an exceedingly rich alluvial brown soil, with considerable sand. This, as a rule, is the best fruit land. We may class 200,000 acres as foothill lands, adapted to many kinds of agricultural and horticultural products and pasturage. At least 100,000 acres of mountain land are adapted to grazing, about 80,000 acres are redwood timber lands of the most magnificent growth to be found anywhere, large quantities of which are being converted into lumber, the amount sawed sometimes aggregating 30,000,000 feet in a single year.

Sonoma Valley, from which the county derives its name, is about 20 miles in length, with an average width of 8 miles. It lies parallel to Petaluma Valley, from which it is separated by a range of mountains.

The streams and watercourses of Sonoma County are numerous, and might, if it were necessary, be utilized for irrigation. On the coast frontage streams of greater or less size flow down from the adjacent hills, at short intervals, to the sea.

Russian River, the largest stream in the county, enters it on the north, flows in a southeasterly direction for 20 miles, turns Fitch Mountain, and finds its way to the lowest depression in the Santa Rosa Basin, from which it breaks through a gap in the Coast Range to the Pacific Ocean.

Russian River gathers the waters from three fifths of the area of the county. Its largest tributary on the northeast is Dry Creek, flowing out of the Coast Range through a splendidly fertile valley 20 miles long and 2 or 3 miles wide, running parallel with and merging into the central valley at the point where Dry Creek delivers its waters to Russian River.

From the northeast, the largest tributaries of the Russian River are

Sulphur Creek, upon which the celebrated Geyser Springs are located, and McDonald Creek, which flows through and out of St. Helena Valley into Russian River. From the mountains on the east, Mark West and Santa Rosa Creeks come down to the plain, and flow for 10 miles across it parallel with each other and 4 miles apart. They empty into the laguna or lake of Santa Rosa, which overflows at high water into Russian River. Copeland Creek comes into the valley from the south, flows northerly, and also empties into Santa Rosa Laguna.

Petaluma and Sonoma Valleys face the bay of San Francisco. They are separated from the Santa Rosa Basin by an almost imperceptible divide, just sufficient to change the watershed from south to north. The streams from these two valleys flow south into navigable estuaries, leading from the bay inland, affording at all times and under all circumstances a cheap, reliable outlet for the product of the soil. All the streams mentioned have tributaries running down from the hills, furnishing to all parts of the county a never-failing supply of pure mountain water.

The mean annual temperature at Santa Rosa is about 57°. In summer there is an occasional hot day, but the mercury seldom rises above 85°. Some winter mornings the thermometer registers the freezing point, but this is exceptional. Rarely does the heat become oppressive in summer or ice form in winter. The difference of averages of temperature for the three warmest and three coldest months of the year is only about 15°. Though nearly all the rains are confined to the winter months, they do not often continue through the season. Usually there are two or three days of steady, downpouring rain at a time without electrical phenomena, followed by a few days and often weeks of perfectly delightful weather without a shower. It is the exception when wet weather continues a week at a time, even in what is called the wet season or season of rains—the winter months. One year with another there is an average of not less than three hundred perfectly fair days per year.

The season of rain may be said to commence in October and end in May, though it sometimes rains in June. It is rare that it rains longer than two or three days at a time, and the intervals between rains vary from a few days to a month or six weeks. As soon as the rain commences in October the grass grows, and by the middle of November the hills and pastures are green. December is usually a stormy month, with now and then a fall of snow in the surrounding hills, but it is rare that the snow falls in the valleys, and it never lies on the ground. The thermometer seldom goes so low as 37° above zero.

Four fifths of the county is susceptible of cultivation, and consists largely of rich alluvium in the valleys, and in the foothills a light sandy soil with a clay subsoil. In the Rincon Valley the soil is deep, of volcanic origin, and is either bright red or ash-colored. The hill soil is intermixed with basalt bowlders. It is strange, but true, that the vine and the olive flourish with extraordinary vigor when placed amid or near these bowlders, whether they crop out above the surface or lie beneath it. It is said that in many parts of Europe olive trees are mulched with broken rock, stone, or pebbles of any kind, that are available for transportation to the locality required. One of the vineyardists on Rincon Heights advances the theory that the basalt bowlders attract and absorb the sun's heat, and when the cool atmosphere after sunset strikes them a heavy moisture supervenes and produces a natural irrigation.

In the Healdsburg district the soils, which in the valley are a deep, rich loam, and in the foothills a red soil, are exceedingly fertile, and all orchards growing in this district yield fabulously. The soils of all the valleys are largely alluvial, and of three distinct grades, generally sharply defined the one from the other, namely: the deep, rich, bright, sandy loams, including gravelly loams with sand; clayey loams, which are generally inclined to be slippery; and clay loam, black with humus and alkali, very sticky and heavy when wet, shrinking, cracking, and cloddy when dry, locally known as "dobe" soil, or black adobe. The first two are very fine fruit soils, when a little elevated and with good drainage. The first is always choice when it has depth enough. The clayey, gravelly soil is very good with the same conditions. The last is not well adapted to fruit. It often produces fine crops, and is fairly good for apples, pears, prunes, and plums on certain roots. The upland soils are of the cretaceous period. At some time away back in the earth's history, but, geographically speaking, recently, its different strata were broken up and burned, giving the clays and clayey soils the character of brick-dust, and with some red color; in fact, baking the clayey strata into brick-like rock in many places, which gradually decomposes into very rich soil when exposed to the elements. This peculiar soil, often freely mixed with the humus of decaying vegetation, is the brown adobe of the foothills.

The southwest quarter of the county is the rich, red cretaceous lands, covered from 6 inches in some places to an unknown depth in others, with a very fine, rich sandy loam, which, seeming in great part, has been drifted in over the first Coast Range by the strong westerly winds. This is a wonderfully fine fruit soil, adapted to all fruits which the climate suits.

The rainfall in Sonoma County is much heavier than in many other parts of the State. Precipitation is not the same throughout the county. More rain falls in the northern territory than in the middle and southern sections. Most years the precipitation at Cloverdale, the most northern town, is 50 per cent greater than at Santa Rosa, and as much as 80 inches of rainfall are recorded there. The story of the rainfall at Santa Rosa, since the early settlement, is told by the following table:

	Inches.
1853-4	29
1854-5	30
1855-6	25
1856-7	25
1857-8	23
1858-9	34.50
1859-60	21
1860-1	17
1861-2	46
1862-3	17
1863-4	12
1864-5	26
1865-6	28
1866-7	40
1867-8	50
1868-9	26
1869-70	25
1870-1	17
1871-2	40
1872-3	21.56
1873-4	29.54
1874-5	23.30
1875-6	34.55
1876-7	15.25
1877-8	44.65
1878-9	31.56
1879-80	31.16
1880-1	34.22
1881-2	17.38
1882-3	24.45
1883-4	20.40
1884-5	15.32
1885-6	37.24
1886-7	19.46
1887-8	20.97
1888-9	95.99
1889-90	55.96
1890-1	29.08
1891	10.55

There has never been a dry season in Santa Rosa Valley. In nearly forty years of cultivation there has not been a crop failure. Of course some seasons have been more prolific than others, but very fair returns have always been secured.

Sonoma is one of *the* fruit counties of California. While a large portion of her area has been devoted to the grape—and in the manufacture of wine she holds a front rank among the counties—all other varieties of fruit have been cultivated to a greater or less extent, and in most instances, when intelligent care has been bestowed upon them, have well rewarded that care.

On Rincon Heights, just back of Santa Rosa, a large number of olive trees were planted on a high, rocky soil, which are now growing beautifully, some already bearing. This was the first attempt at olive cultivation near the city, and has proved the soil and climate to be admirably adapted to this important industry.

The peach, prune, apricot, pear, plum, apple, and cherry thrive in all parts of Sonoma County. The Bartlett pear, so much sought in Eastern markets, grows in its highest perfection there, many horticulturists making it a specialty; it is, in fact, one of Sonoma's standard industries. The demand is growing, and its production is very profitable. The orange, lemon, and lime grow in the warm belt, which encircles the valleys, without irrigation. In the open valley there is danger of injury by frost; but on good loam soils, from 50 to 400 feet above the valley, citrus trees thrive and bear fruit.

The fig grows everywhere, except on the lower lands. Two crops are produced, and all varieties thrive. The palm, all varieties, the dracæna, fan-leaf, and date, grow everywhere in the district, with but the ordinary care given common trees.

Currants, gooseberries, blackberries, raspberries, strawberries, and almost everything else grow with great luxuriance, in prodigious quantities and of enormous size, without irrigation. Grapes will yield from 2 to 7 tons to the acre, according to the variety and soil. As a rule the high-grade wine grapes are light bearers, from 2 to 3 tons for the Cabernet Sauvignon, worth $30 per ton. The Mission grape will yield from 5 to 10 tons to the acre. Pears will realize $200 per acre for shipment to the East. Prunes, at present prices, will yield from $200 to $300 per acre. The peach trees bear at three years old, and will yield 50 pounds to the tree. Plums succeed in all situations, in all varieties, and bear heavy crops.

The following report from the Santa Rosa "Republican" gives a graphic account of the horticultural adaptabilities of Sonoma County:

"Coastward the summer climate is rather cool for nearly all fruits, though fine for some varieties of apples, pears, plums, and small fruits. In places with a southeastern exposure, completely sheltered from summer ocean winds, nearly all fruits do finely quite near the coast. Eight to 12 miles from the coast are climates and soils for winter apples and most other fruits, according to exposure. The summer climate of this region is grandly fine when sheltered in part from the summer ocean winds, and is also very mild in winter.

"Passing to the north the Coast Range becomes higher, and is generally covered on the east and north slopes with those two grand and towering trees—the redwood and Douglas spruce—with a sub-growth of oaks, and many other trees and shrubs. These high hills and their forest covering shelter the country to the east from the cool summer winds in part, which gives the finest climate, for peaches and nearly all other kinds of fruits, to be found anywhere. This, coupled with a soil of nearly absolute perfection in every particular, goes to make up the great Sebastopol and Forestville fruit region.

"Then, on we go, up the west side of the Russian River, with the finest of rich, deep, sandy, and gravelly loams in the valley, and the choice red, mellow clays on the foothills. The climate has become warmer in summer and very little cooler in winter as we proceed northward. Fruits ripen earlier there and are indeed choice. The people up there are very proud of their country for fruit, and no people have any better right to be proud.

"From Healdsburg stretches due north Dry Creek Valley, with rich loams and a hot summer climate—at times a trifle too hot for comfort. Still people there make no complaint, and produce a large amount of fruit. Healdsburg is noted for its plums, prunes, Bartlett pears, choice peaches, and small fruits, with quite a sprinkling of oranges. Then, on up the Russian River Valley, with fine fruitful valleys stretching into the mountains, with some gently elevated slopes, until we reach Cloverdale, where everything in the horticultural and climatic line seems to come to a head. Whenever they have a clear day at Cloverdale, summer or winter, it is warm, but with the nights always cool; the people like their climate. Their fruits certainly like it, and grow finely. Here we find oranges planted by the acre and doing splendidly, with the fruit ripening early, and with luscious sweetness and flavor.

"Then, back south among the hills and mountains to the east we find tens of thousands of acres of warm red and yellow clays. There peaches, plums, and prunes are not so large and juicy as those grown in the valley loams and the warm sands of the hills, yet they are sweet and rich, and specially valuable for drying.

"The wine grapes of this region are the acme of perfection, and the olive flourishes like a green bay tree. Part of this region is steep, rough, and stony, yet there are many fine slopes and table-lands—splendid for orchards and vineyards. It seems to have been perfectly designed for olives and wine, in many parts a rough, wild country with many natural curiosities, mineral and hot springs, mines, building stone, petrified forest—everything but little level land and no poor soil, for where there is any soil at all it is rich.

"If we keep on south we will gradually drop into the Sonoma Valley through Los Guillicos, at Glen Ellen. This vicinity and adjacent foothills have a vast amount of fine fruit soils. The climate is fine in every way for all life. It is the oldest settled point in the county, both by Spaniards and Americans. The facilities for fruit growing are superb, two railroads traversing the valley from end to end, with navigable tidewater at the mouth of the valley. A few years ago much of the valley was in magnificent wine grapes. The phylloxera destroyed many vineyards, giving a cruel blow to the prosperity of the people. Many of the vineyards are being reëstablished on resistant roots, or are being planted to fruit trees. Then, over the hills west, 8 miles through a country nearly as good as the best, to Petaluma, around which snug city are many fine orchards, and very profitable ones. Here, near Petaluma, it is claimed were planted the first orchards on the dry hills that proved a success without irrigation, a most valuable lesson to the whole coast country. The venerable J. W. Cassidy was a pioneer in this dry-land planting, and his fine 20-acre orchard, on what a few years ago were called worthless sandhills, has proved such a success that those sandhills are now worth $200 per acre.

"We have now left the great northwestern portion of the county, lying between Russian River and the ocean, comprising several Government townships, a jumble of hills, though much of the territory is smooth and not rocky, with a fine, rich, clayey soil, climate superb, except where directly facing the ocean, and even that suits many people best of all. It is a rugged country, but capable of supporting quite a dense population in health, comfort, and plenty. There is hardly an acre of it that would not grow as much value in the right fruits as in any portion of the State. It is adapted to olives, apples, pears, plums, prunes, and choice table and wine grapes. The hills are no steeper than those on which are the mass of the finest vineyards and orchards of Europe, and like them should be cultivated by hand labor. It will be a glorious country some day. It is now used by stockmen and sportsmen.

"We have now skimmed lightly over the entire county, and there is little use to particularize further, so far as fruits are concerned. There is scarcely a plowable plot of land in the county, great or small, that a rustling, intelligent man cannot cultivate in fruits of the great commercial species adapted to the soil and climate without success, if he plants the right varieties and cares for them properly.

"The homely old apple, the king of fruits, can be made to pay as large, sure, and permanent income per acre for a term of years as any other fruit in any part of the State. The Sonoma County orchardist has no cause to fear competition with the fruits of any other district. If he is not a taker of blue ribbons when competing with fruits grown anywhere, he is the party in fault, and not the county, her soils, or climate. He may let citizens of other portions of the Golden State occupy the top round of the ladder beside him, but representatives of no other State or country can gain that round in fair competition.

"Our modes of orcharding are not perfect, but we are learning year by year, and most of us are willing to learn. We have had many serious and, to us, entirely new difficulties to meet in the past few years. The many have met them manfully, and conquered. The few have been whipped, and dropped out. All must expect future troubles. Yet if we meet them with intelligence, industry, and patience, we shall still hold the fort.

"Two of the largest canneries of the State are located at Santa Rosa. The Hunt Bros.' Fruit Packing Company commenced business in 1887, and was incorporated in 1890. The officers are: J. H. Hunt, President; W. C. Hunt, Secretary; Allen A. Curtis, Vice-President; L. W. Burris, Treasurer. The plant includes a cannery 120 by 180 feet, and a drier 66 by 80 feet, and they are located near the Donahue depot. The total cost of the plant was over $30,000, and it contains all the best machinery necessary for canning and drying fruit and preparing it for shipment to market. Something of the amount of business done by this company can be seen from the fact that 4,500,000 pounds of fruit were used in 1890, and there was paid out the neat sum of $225,000, $35,000 of which went to the 500 hands employed in and about the vast establishment, and $100,000 for fruit alone. In 1890 the pack amounted to 20,000 cases of canned goods and 30,000 cases of dried fruit. The amount of fruit used in 1891 was 6,300,000 pounds, or over 3,000 tons. The amount of money used in the same year reached the figure of $200,000. There were 550 hands employed, and 50,000 cases of canned goods were packed; 20 cars of dried prunes and 50 cars of dried grapes were handled, and the amount of money paid out for labor in 1891 was $30,000, while that paid out for fruit was $75,000. The company ships its goods to all the big markets of the United States, London, and Australia.

"The Santa Rosa Packing Company was established in 1881, J. Black being the first manager. In 1884 the pack was 6,000 cases, while the first year's pack was 5,000 cases. In 1885 were packed 10,000 cases; in 1887, 25,663; in 1888, 36,380; 1889, 14,490; 1890, 62,775. Last September Mr. Perry, the manager at that time, estimated that since 1881 $150,000 had been paid out for labor and $350,000 for material, about 70 per cent of which went to Sonoma County people. In 1890 $200,000 were paid out for labor, fruit, and improvements by this company, $800 being for cartage, all of which cartage fees went to Santa Rosa men. At that time Mr. Perry estimated that the canneries of Sonoma County were paying out between $2,500 and $3,000 per day for labor, and it all went to those most in need of it.

"The Petaluma Fruit Packing Company is another institution that contributes very materially to the prosperity of Petaluma and Sonoma County. It is located below the drawbridge, and can be reached by water and by rail. M. P. Ashby is the Superintendent. It packed last season about 48,307 cases of fruit, there being of peaches, 12,000; plums, 9,500; pears, 7,000; apricots, 11,500. There were 350 hands employed, and the payroll aggregated about $28,000, while the amount paid for fruit was fully $48,000.

"The Sonoma Packing Company is a new concern, having been established by parties from Boston, Mass. G. O. Sanborn is the Superintendent, and the institution has the reputation of turning out a very superior article of pickles, catsups, Chile sauce, jar honey, etc.

"Petaluma has a large fruit drier, the property of C. W. Adamson, who has lately added a distillery, and is now working over the pomace into brandy. Mr. Adamson has put up large quantities of fruit this season, and will do even more next year. His plant is just across the creek from the cannery.

"The Russian River Packing Company has one of the best plants in the county. It was built last season, being completed in time to do but a limited amount of business. Its Superintendent is Dr. Biddell. Having been built since the other canning establishments in the county, it possesses all their best qualities and some qualities they have not, among them being the rotary soldering machine. The Russian River Packing Company employed about 225 hands last year, but when the cannery is working in full blast about 400 people will be laboring there. The rooms are all well lighted and ventilated, there are convenient cloak-rooms, and, altogether, great pains have been taken to provide for the health and comfort of the employés.

"The Star Dried Fruit Company, in which the proprietors of the Russian River Packing Company are interested, employed between 50 and 75 hands when running in full blast, and already over 1,000,000 pounds of fruit have been shipped away from their warehouse, 800,000 pounds of which were prunes.

"The Van Alen Packing Company is an extensive institution, and was established in 1887. It is located on the north side of the river, and not far from the railroad bridge. Between 20,000 and 25,000 cases of fruit were packed at the Van Alen cannery last season, about three fourths of which were peaches. About 3,000 cases of cherries, 1,500 of pears, 2,500 of plums, 4,000 of apricots, and 200 cases of berries were put up. A large drier has been erected near the cannery, and about 35 tons of prunes were dried in this, its first season. This company paid out $25,000 for fruit and about $16,000 for labor last year.

"L. H. Stewart is Superintendent of the Magnolia cannery, T. S. Merchant, proprietor. The Magnolia was established in 1888. It began its season's work in May, the first fruit handled being cherries. Of these, 3,000 cases were put up; of blackberries, 1,600 cases; standard fruits, 22,000; total, including jellies and jams, about 45,000 pounds. Between 400 and 500 hands were employed, and over $50,000 were paid out for fruits alone. Fifteen different kinds of jellies and twelve different kinds of jam, or about 6,000 cases, were put up this year.

"The viticultural interest of Healdsburg is very extensive, there being more than half a dozen wineries, some of them having distilleries attached. Over 4,000 tons of grapes were produced in the Healdsburg district last year, and of that crop fully one fourth went to the great winery of Kohler & Frohling, near Windsor. Over 1,000 tons of grapes were dried in this district the past year. About 100,000 gallons of wine were made in the district—10,000 by the Funston winery, 20,000 by Paxton & Gobbi, 15,000 by Davidson, and 10,000 by Weiderhold. Simi's wine cellars have a capacity of 600,000 gallons, but their product during the year we have not learned. There are a number of wineries near Healdsburg; all are doing a big business, but lack of space prevents us from mentioning it here. Nearly all the Healdsburg wine has been sent to San Francisco, while large quantities of grapes from the district have been sent to the must condenser, to Hunt Bros., and to others. It is estimated that about 40,000 gallons of brandy were produced in this district last year."

The chief fruit sections of Sonoma County are Healdsburg, Cloverdale, Sebastopol, Santa Rosa, Green Valley, Petaluma, and Sonoma, and the principal fruits are cherries, peaches, pears, and prunes. These are shipped both green and dried. Besides these, deciduous fruits do well. The Japanese chestnut bears finely, and berries of all kinds are a sure crop.

Prices for fruit in Sonoma for the past two years ruled as follows:

	1891.	1892.
Pears	1½ to 1¾ cents.	1½ to 2 cents.
Peaches	1½ cents.	1½ to 2 cents.
Cherries	6½ to 7 cents.	5 to 7 cents.
Apricots	1½ cents.	1½ cents.
Plums	1¼ cents.	1 to 1½ cents.
Prunes	1¼ cents.	----------
Apples	1½ cents.	2 to 2¼ cents.

The yield for the present season was very light, peaches not averaging over one half crop, pears and apples one half, cherries one fourth, and prunes one half to two thirds of a crop.

ACREAGE AND VARIETY OF FRUITS IN SONOMA COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	3,100	1,021	4,121	220
Apricot	129	100	229	37
Cherry	150	167	317	106
Fig	30	21	51	19
Olive	156	451	607	132
Peach	1,707	800	2,507	238
Prune	1,018	1,581	2,599	527
Pear	984	423	1,407	117
Plum	12	8	20	2
Lemon	1	1	2	----------
Nuts—Almond	37	33	70	16
Walnut	38	42	80	12
Table grapes	427	----------	427	----------
Small fruits	200	----------	200	----------
Totals	7,989	4,648	12,637	1,426

STANISLAUS COUNTY.

Stanislaus County is one of the San Joaquin Valley group, and is bounded north by San Joaquin and Calaveras, east by Calaveras and Tuolumne, south by Merced, and west by Santa Clara. It extends across the entire width of the San Joaquin Valley, reaching from the summit of the Coast Range on the west well into the foothills of the Sierra Nevada on the east, and includes within her limits an area of 1,500 square miles, or 924,800 acres. Both its eastern and western borders present on the map greater breadth than the center. The San Joaquin River, a navigable stream for eight months in the year, flows across the county some miles west of the estimated geographical center. From that stream diverge two tributaries, or arms, the Stanislaus and Tuolumne, both leading eastward to the Sierra, and both of which are navigable for from three to six months in the year. There are also several other streams of more or less importance throughout the county.

The greater part of the county is an almost level plain, stretching away in every direction until it merges into the foothill and mountain region on the east and west.

The climate of Stanislaus does not vary materially from that of the other counties in the San Joaquin Valley. The summer months are warm, and in July and August frequent hot days occur, when the mercury will range to 100° and over, sometimes reaching 110° to 112°. The autumn months are very pleasant and the spring months perfect. During the winter, which extends from November to April, the weather, when no rain is falling, is all that could be desired—pleasant, balmy, and invigorating. Occasionally a light frost will occur, but seldom of sufficient severity to do any damage except to the tenderest vegetation.

The average rainfall of Stanislaus is under the general average of the State, the precipitation at Modesto being about 9½ inches. The following table shows the average monthly precipitation at the principal points in the county:

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Grayson	2.21	1.77	1.62	1.22	.44	.17	.00	.00	.01	.47	1.22	2.70
Hills Ferry	1.17	2.11	2.45	1.47	1.04	.41	.00	.00	.19	.32	.56	1.97
La Grange	2.86	2.75	2.55	1.48	.52	.08	.00	.00	.30	.93	1.96	2.22
Modesto	1.84	1.31	1.27	1.03	.40	.13	.01	.00	.11	.42	1.25	1.63
Oakdale	1.51	.53	3.41	1.56	.25	.05	.00	.00	.00	.30	.73	1.10
Turlock	1.05	1.70	1.62	1.54	.62	.38	.00	.00	.03	.64	.80	.97

On the eastern side of the county the soil is of a sandy nature, merging into loam as the foothills are approached. The prevailing soil on the west side is a rich loam of an indefinite depth, and which under water is wonderfully fertile. The San Joaquin River divides the county a little west of its center line, and this is bordered by a belt of tule land from 1 to 2 miles in width. The lands immediately adjoining this on the east side, for a width of 1 to 5 miles, are principally adobe. The lowlands adjoining the Tuolumne River are very sandy, while those along the Stanislaus are a dark, firm loam. In the central part of the county the soil is of a sandy character, especially to the south of the Tuolumne River, changing northward and westward to grayish and blackish loams. Some alkali patches are found in the lower lands, but these are not very extensive.

Two of the finest and most extensive systems of irrigation in the State are under way in this county, both of which are being carried on under the operation of the Wright Act. These are the Modesto District, covering 81,000 acres, and the Turlock District, with 176,000 acres.

The petition for the formation of Modesto District was presented to the Board of Supervisors May 11, 1887, and was considered by them from the date of its presentation to June 7, 1887. There was considerable opposition made to the organization of the district, on the ground that the opponents did not desire irrigation by any plan. However, the petition was granted with certain modifications. The election for the district was ordered on June 7, 1887, and was held on July 9, 1887. The number of votes cast was 856—700 for and 156 against.

The following Directors were elected: J. W. Davison, E. H. Catlin, R. McHenry, A. C. Carver, W. H. Finley. Robert McHenry was elected President; J. W. Davison, Secretary; I. Perkins, Treasurer.

An election for bonds was ordered on November 18, 1887, and it was proposed to issue bonds for $800,000. The election was held on December 4, 1887, and resulted: 439 ayes to 66 noes. Bonds to the amount of $800,000 were therefore issued and advertised January 7, 1889, and bonds to the amount of $142,000 have been sold.

A weir dam is being constructed across the Tuolumne River, near La Grange, at a point about 1,450 feet below the county boundary line, between Stanislaus and Tuolumne Counties. This dam is curved in form and built of rubble masonry and concrete. It will be, when finished, 129 feet high, 20 feet wide, and 320 feet long at the crest, and 90 feet wide and 60 feet long at the base. It will contain about 32,000 cubic yards of rubble masonry, and is to be built by and for the joint use of the Modesto and Turlock Irrigation Districts. This will be the highest weir dam in the United States, having an overflow of over 160,000 cubic feet per second at extreme high flood. The plans for this dam were approved by Colonel Mendell, United States Government Engineer for the Pacific Coast. The work is estimated to cost $425,000. The dam is now finished to a height of 60 feet, and 12 miles of canal are completed. By the next irrigating season there will be 20 miles of canal, and the dam will be over 90 feet high.

The first 2 miles of the canal follows the steep bluffs of the river, in places nearly perpendicular. The formation is slate and some little hard rock. The plan is to have an outside retaining wall of rock, a puddle wall, and inside riprap. The larger cañons will be crossed with flumes on wooden trestles. The grade along this portion of the canal is 1.5 feet to the 1,000 feet, the bottom width of canal 16 feet, with a slope of a quarter to one, and the depth of water 7 feet. The canal is calculated to carry 640 cubic feet of water per second, with a velocity of 4.9 feet. The grades and velocity on the flumes are greater, and the width of same on bottom will be 10 feet, with 7 feet depth of water. After the first 2 miles the canal leaves the steep slopes of the river bank and follows the plateaus and benches, where the only difficult work will be the construction of a tunnel about 1,200 feet in length and the crossing of deep cañons. The grade on this portion of the canal is 1 foot to the mile; width of canal on bottom, 28 feet, with a slope of two to one; 7 feet depth of water; velocity, 2.43.

The Turlock District enjoys the distinction of having been the first one organized under the provisions of the Wright Act. The petition for the organization of the Turlock District was presented to the Board of Supervisors on April 11, 1887, the same embracing about 30,000 acres of land in Merced County. The total area of the district is about 176,210 acres, the greater portion being in Stanislaus County. The Supervisors considered the petition from April 11 to April 28, 1887. No opposition worthy of note was made, except as to particular boundaries, therefore the petition was granted, and an election was ordered April 23, 1887, with the slight changes necessary in the proposed boundaries. The election was ordered to be held on April 28, 1887, and the district was organized by the Board of Supervisors pursuant to the election on June 16, 1887. The Directors elected were: E. V. Cogswell, R. M. Williams, E. B. Clark, W. L. Fulworth, and J. P. Dunn.

The first meeting was held and organization effected on June 5, 1887, and E. B. Clark was elected President, R. M. Williams Secretary, and C. N. Whitmore Treasurer. The only action taken was the selection of officers and some routine business transacted. Preliminary plans and estimates were ordered on June 15, 1887, and were completed and adopted September 15, 1887, George E. Manuel being the civil engineer who made the same.

The area of the Turlock District is nearly 177,000 acres. The capacity of the canal is 1,500 cubic feet per second. This will give 1 cubic foot to each 118 acres for the whole district. Work on the main canal was started in March, 1890. There are nine drops in this canal, varying from 3½ to 11 feet. There are four tunnels, aggregating in length 1,500 feet. The canal varies in width from 20 to 40 feet, and has an average depth of 7 feet. As indicating the work on the canal, and its cost, Eugene H. Barton, Chief Engineer, furnishes the following report of the work completed in June, 1891:

Section 1, Main Canal.—Sub-section 1 was composed entirely of slate and was very expensive to cut, costing $5 35 per running foot, requiring also retaining, riprap, and puddle walls; total cost, $21,490 25. Sub-section 2 was a thorough cut through cemented gravel, clay, and hardpan, containing 90,000 cubic yards; extreme depth, 56 feet; total cost, $25,388 33. Sub-section 3 was a thorough cut through cemented gravel, hardpan, sandy soil, and basaltic rock; extreme depth, 27 feet; total cost, $14,851 11. Sub-section 4 was scraper work; sandy loam, containing 53,000 cubic yards; total cost, $8,762 48. Sub-section 5 is tunnels 1, 2, and 3; total length, 1,000 feet, containing 9,560 cubic yards, the approaches to the tunnels containing 8,000 cubic yards; total cost, $14,218 98.

Section 2, Main Canal.—Sub-section 1 was a thorough cut through cemented gravel, hardpan, and soil. This cut was taken out by the hydraulic process, water having been taken from the La Grange Ditch and the Hydraulic Mining Company's reservoir, 4 miles distant, the district constructing about 7,000 feet of ditch and inverted siphons to deliver the water at the pressure-box, giving a 100-foot pressure to the grade line of the cut. A flume was constructed with 2 feet fall to the 100, 3,000 feet long, to carry material to the waste ground; containing 242,000 cubic yards; entire cost, $78,554 89. Sub-section 2 was light scraper work, including thorough cut; extreme depth, 18 feet, containing 208,000 cubic yards; total cost, $44,696 94. Sub-section 3 was light scraper work, containing 267,854 cubic yards; total cost, $45,259 03. Sub-section 4 was light scraper work and thorough cut; thorough cut contained 70,000 cubic yards of hardpan; extreme depth, 30 feet. The sub-section contained altogether 218,531 cubic yards; total cost, $18,651 90. Sub-section 5 was scraper work and heavy cutting, containing 172,000 cubic yards; total cost, $14,878 32.

There have thus far been moved 1,282,000 cubic yards to build main canal.

At the end of the main canal five lateral canals are built, distributing water through the entire district. Smaller canals are built from the lateral canals to deliver water to each section. Eight hundred thousand dollars have been expended on construction, and incidental expenses, buying rights of way, and cost of dam will bring the cost of the entire system up to $1,100,000. A weir dam has been constructed across the Tuolumne River near La Grange, at a point about 1,450 feet below the boundary line between Stanislaus and Tuolumne Counties. The dam is curved in form and of rubble masonry and concrete. It is 105 feet high, 20 feet wide, and 320 feet long at the crest, and 90 feet wide and 60 feet long at the base, containing about 32,000 cubic yards of rubble masonry. This dam was built by and for the joint use of the Turlock Irrigation District and the Modesto Irrigation District. This is the highest weir dam in the United States, having an overflow of over 160,000 cubic feet per second at extreme high flood.

The plans for this dam were approved by Colonel Mendell, United States Government Engineer for the Pacific Coast. The structure cost $325,000.

IRRIGATION WORKS IN STANISLAUS COUNTY.

Name.	Miles.	Value.
San Joaquin and Kings River Canal	11½	$25,000 00
La Grange Ditch—mining	4	6,000 00
San Joaquin Ditch—irrigating	5	5,000 00
Knights Ferry Water Company—irrigating		600 00
Totals	20½	$36,000 00

Stanislaus County is eminently adapted by location, climate, and soil for horticulture, and nearly all varieties of fruit will grow and do well there. The larger part of her area has heretofore been devoted to cereal growing, but of late years more attention has been given to fruit, and the extent of land planted to orchards has been largely increased by means of the irrigation works which have been inaugurated in the past few years. At Knights Ferry, K. Vogt has a fine orchard of between 500 and 1,000 orange trees, which yield excellent fruit in abundance. At Turlock, Lusk & Co. have a large tract of land which they will plant to fruit.

Grapes arrive at a high state of perfection in Stanislaus County. Much of the soil is peculiarly adapted to the growth of the vine. There is there the same quality of soil that produces the raisin grape in such quality and extent that Fresno has been made famous thereby. The wine grapes also attain a superior degree of richness in color and flavor.

In all parts of the county grapes are grown successfully, and there is a good foundation for the belief that with the advent of irrigation the acreage devoted to viticultural purposes will be doubled and quadrupled.

Nearly every known variety of fruit reaches a state bordering on perfection in Stanislaus County. Peaches, pears, nectarines, apricots, plums, apples, figs, walnuts, almonds, etc., are common products there, and in some parts of the county it is claimed that apples superior in size, flavor, and quality are raised. Small fruits and berries thrive luxuriantly in most parts of the county, while watermelons of mammoth proportions and delicious, tempting flavor mature on the plains without irrigation.

At Murphys very fine apples are grown, excelling there all other fruits, the favorite varieties being the Baldwin, Alexander, Winesap, Red Astrachan, Yellow Bellflower, Rhode Island Greening, Spitzenberg, Red Cheek Pippin, Swaar, White Winter Pearmain, Porter, Hubbardston's Nonesuch.

The leading fruits about Burson are peaches, almonds, figs, grapes, and berries. West Point is a splendid district for apples; they keep splendidly, and cannot be beat for fine flavor and keeping qualities. They are mostly sent to Stockton for market. They net there about 1½ cents per pound in bulk or in boxes. With a railroad this could be made a splendid paying business, equal to an orange grove.

The principal fruit sections of this county are Knights Ferry, Oakdale, Modesto, and Riverside, and peaches, apricots, and nectarines are the chief fruits grown for market. At Knights Ferry there are several extensive orange orchards, and one, belonging to Kaspar Vogt, has a well-earned reputation all over Northern California for the excellence and size of the fruit grown. A large number of fig trees are also grown over the greater part of Stanislaus County. Nectarines and almonds also do well there. Stanislaus is one of the oldest fruit-growing counties in the State, taking its start as a mining county in the days of the gold excitement; a number of family orchards were planted at that early period, and one at Knights Ferry, now owned by Mr. Collins, consisting of peaches, apples, pears, and other deciduous fruits, was planted as early as 1856. The Pentaland Bros. also planted an orchard in 1856, which was washed out by a flood at a later date and destroyed. Oranges were marketed from Vogt's place as early as 1874. One of the largest orchards in the county of Stanislaus is that owned by Mrs. Stephen Rogers, at Modesto. This is known as the "Paradise Orchard," and is located 5 miles southwest of the town, on the Tuolumne River bottom. All varieties of fruits and vegetables are grown there without the aid of irrigation. One hundred and ten acres of this were set to oranges twelve years ago, and the trees are now in full bearing. A large portion of the products of this orchard is shipped directly East. There is a small cannery in connection with this orchard, and a car of dried fruit was sent to Eleanor last year.

The fruit crop of the present season is reported light, peaches and prunes falling below 50 per cent. The crop of English walnuts and almonds is reported as being good.

A very large portion of the fruit produced in Stanislaus County finds a ready market in the East, and is shipped both dried and green. There has been a very large area of new land set to fruit during the present season, most of which belongs to the citrus family.

ACREAGE AND VARIETY OF FRUITS IN STANISLAUS COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	101	81	182	20
Apricot	122	77	199	18
Cherry	18	14	32	5
Fig	57	86	143	47
Olive		22	22	8
Peach	180	160	340	72
Nectarine		7	7	1
Prune	5	43	48	17
Pear	94	84	178	15
Lemon		4	4	
Orange	15	97	112	58
Nuts—Almond	11	25	36	10
Walnut		3	3	
Totals	603	703	1,306	271

SUTTER COUNTY.

Sutter County is located in the Sacramento Valley, midway between the Sierra Nevada on the east and the Coast Range on the west. It is bounded on the west by the Sacramento River, which separates Sutter from Colusa and Yolo Counties; on the south by Sacramento County; on the east by Placer, Nevada, and Yuba Counties, and on the north by

Butte County. The outline of the county is very irregular, and the area is 610 square miles, or 391,000 acres.

Sutter is the only county in the State which lies wholly within either of the great valleys, and, with the exception of the buttes, which rise abruptly from the valley in the northern part of the county, it is simply an immense plain. These buttes, now commonly known as Sutter Buttes, form the most conspicuous and notable topographical feature of the Sacramento Valley. They rise abruptly from the plain to a height of nearly 2,000 feet; occupy an area of 4 by 12 miles, and can be seen for a distance of 100 miles from the north and south. In these mountains there are numerous little coves which are tillable, and the hill lands are found excellent for grazing purposes. About 125,000 acres of land are tule or overflowed land. During high water the Sacramento River sends a part of its stream through Butte Slough, which, after flowing a few miles between well-defined banks, spreads out and forms the Tule Basin. The depth of water in this basin is from 2 to 10 feet. The water remains there until May or June, when, the river having receded, the basin is drained of its waters at the lower end, near the junction of the Feather and Sacramento Rivers. Before the water falls the tules, a vegetable growth from which the basin takes its name, spring up and grow very rapidly. The tules are similar to the rushes in the Eastern swamps, growing as high as 20 feet, and close together. This immense vegetable growth dies or is burned down every fall, and its remains mix with the sand deposited by the water when standing in the basin. This, going on for ages, has formed a soil of incredible fertility, but now rendered almost worthless by water. The northern end of these tule lands has been redeemed, and now constitutes a levee district of 10,120 acres, and is most valuable.

Situated in the heart of the Sacramento Valley, Sutter has the climate peculiar to that valley, and all that has been said of the surrounding counties in this matter applies equally to her. Extremes of heat and cold are unknown, yet there are occasional frosty mornings in the winter months, and days that are sometimes uncomfortably hot in the summer, when the mercury will reach above the 100° limit. These extremes, however, are of rare occurrence. The range of temperature between the lowest in winter and the highest in summer will be from 20° for the former to 110° for the latter. These are the extremes, the average annual temperature being about 60°.

The prevailing winds of the Sacramento Valley are from the south. They are cool, moist sea breezes, tempered by their overland journey. This breeze blows on an average two hundred and fifty days in the year. North winds are of less frequent occurrence and far less pleasant in their effects. These winds sometimes cause great damage to the growing crop, sapping the moisture from the grain and causing the kernels to shrink and lose in weight and quality, or coming when the grain has ripened they thrash out the matured grain, entailing great loss to the farmers.

The rainfall is usually ample, and dry seasons exceptional. The average fall from a record of ten years gives 19.318 inches as the annual precipitation, which is above the average of most other portions of the State.

The lands on the Sacramento River are highly productive, and largely under cultivation. The lands of the county are mostly dark loams, with some red, gravelly clays on the higher elevations. Stiff adobe tracts extend both north and south for some distance from the foot of the buttes, and are found also in the lower grounds south of Yuba City and along the swamp lands. The alluvial lands, which are extensive, are suitable for all kinds of farming. The dark uplands, with clay subsoil, generally have a deep soil, in depth from 10 to 20 feet, and are well adapted to wheat, barley, or general farming. They endure drought and wet better than any other, and are easily cultivated.

Sutter has an almost unlimited water supply. Yuba River and other smaller streams head high up in the Sierra, and are fed by the melting snow of summer, and these furnish abundant water for irrigation where it is necessary to resort to artificial watering of the land. The land surface presents no engineering difficulties, and ditches are easily and cheaply constructed. While the ample rainfall of the winter months renders irrigation unnecessary in a large part of Sutter County, there is a great deal of land which requires the application of water in the summer months to insure crops. This is especially the case in the foothill region. There are a number of old mining ditches which have fallen into disuse with the decadence of mining, which can and will come into service again for the use of the orchardist and vineyardist.

Sutter has the honor of being the pioneer horticultural county of the Sacramento Valley. The first attempts in this line were made by General Sutter, at Hock Farm, in 1842, when he planted grapes, pomegranates, and a large grove of fig trees. The productions of this county will cover almost the entire line of horticultural products of the State. Oranges and lemons, while not extensively grown, do well where they have been tried, while peaches, pears, plums, apricots, nectarines, figs, pomegranates, and other deciduous fruits seem to find in its soil and climate the very conditions they require for perfect growth. One of the largest peach orchards in the State, covering 575 acres, is near Yuba City.

One of the best arranged and most productive orchards of Sutter County is that owned by H. P. Stabler. Last year the product of this orchard was 500 tons, most of which was shipped East, the remainder being sold to the Yuba City cannery. The fruits raised there are of different varieties, consisting of peaches, prunes, apricots, and nectarines, and, because of their superior quality, have always commanded the highest prices, both in local and Eastern markets. The orchard, comprising 100 acres, was planted in 1885, and is divided as follows: Planted to peach, 60 acres; prunes, 25 acres; apricots, 8 acres; and nectarines, 7 acres. The land being high produces a better quality of fruit for shipping purposes, as the fruit contains more saccharine matter and is much drier than fruits produced on low land.

Another prominent orchard of Sutter County is the Abbott orchard, on the west bank of the Feather River, about 9 miles from Marysville. The orchard contains 425 acres; the first 50 acres were planted in February, 1883. In 1885 the sales of fruit from this 50-acre lot amounted in round numbers to $6,000, and the next season to $12,000. Since that date the production has largely increased, but has not been kept separate from the balance of the orchard.

The small fruits and berries reach perfection on the slough and bottom lands of Sutter, where they thrive without irrigation. On the higher and drier lands irrigation is necessary in their culture.

The principal fruit sections of Sutter County are found along the

Feather River, some small sections on the Sacramento River, and in the foothills near the Marysville Buttes. The varieties best adapted to growth in these localities are peaches, pears, prunes, and plums. Cherries, figs, apples, and almonds are also grown, but not to the same extent as the first-mentioned varieties. The crop is disposed of to the local canneries and in San Francisco, while a very large percentage finds its way to the Eastern markets. That which is shipped East is packed in standard boxes and crates, and for the San Francisco and local canneries it is forwarded in regular orchard boxes. The output of fruits of different orchards in Sutter County during the year 1891, and for the present year, is given below:

	1891—lbs.	1892—lbs.
Apples	392,450	391,600
Apricots	2,052,300	1,625,000
Cherries	495,400	526,200
Figs	54,250	58,000
Olives	31,700	32,000
Peaches	7,459,100	9,696,830
Pears	2,550,000	2,800,000
Prunes	1,257,300	838,200
Plums	639,500	592,000
Lemons	1,000	1,200
Oranges	32,600	35,000
Almonds	48,000	60,000
Raisin grapes	2,508,000	3,110,000
Table grapes	600,000	800,000
Totals	18,121,600	20,566,030

The prices for the seasons of 1891 and 1892 were as follows:

	1891.	1892.
Apples	1½ to 2c.	2 to 2½c.
Apricots	1½c.	2 to 2½c.
Cherries	5 to 7c.	5 to 10c.
Peaches	1½ to 2c.	2 to 2½c.
Pears	1¾ to 2c.	1¾ to 2¼c.
Prunes	6½c.	9½c.
Plums	1 to 2c.	2 to 3c.
Almonds	11c.	12½c.
Raisins	5c.	5c.
Table grapes	2 to 2½c.	2 to 3c.

The crop of prunes and apricots is short for the present season. All the other fruits yield a fair average crop.

Acreage and Variety of Fruits in Sutter County.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	40	36	76	12
Apricot	164	63	227	21
Cherry	37	4	41	1
Fig	14	70	84	20
Olive	13	4	17	2
Peach	597	384	981	120
Prune	148	79	227	28
Pear	170	222	392	50
Lemon	1	1	2	....
Orange	3	24	27	6
Nuts—Almond	159	145	304	50
Walnut	13	2	15	1
Raisins	418	....	418	....
Table grapes	34	....	34	....
Totals	1,811	1,034	2,845	311

TEHAMA COUNTY.

Tehama County is situated on both sides of the Sacramento Valley, and reaches from the summit of the Sierra Nevada Mountains on the east to the summit of the Coast Range on the west, with the Sacramento River running through the center from north to south. It is bounded by Shasta on the north, Plumas and Butte on the east, Butte and Glenn on the south, and by Mendocino and Trinity on the west. It has a breadth of 38 miles from north to south, and a length of 78 miles from east to west, giving it an area of 3,125 square miles, or nearly 2,000,000 acres.

The surface of Tehama County consists, first, of a section of the Sacramento Valley, which, below Red Bluff, expands into a broad and level plain, swells on the west into low, level prairies, that further on lift into broken hills, with the steep and rugged slope of the Coast Range beyond. Heading in these mountains, numerous streams flow east into the Sacramento, the principal of which are the Cottonwood, Dibble, Reed, Redbank, Elder, Thomes, and Stony Creeks. On the east this valley is bounded by a lava flow, which extends for 20 miles or more up the western slope of the Sierra Nevada Mountains. Through these lava beds the large streams that carry the water caused by snow and rain on the slope of the Sierra Nevada have eroded deep, dark, and craggy cañons; above these lava beds the Sierra becomes more precipitous, rising at some points to an altitude of more than 10,000 feet.

To the north Mount Shasta lifts itself to a height of 14,442 feet above sea-level, 7,000 feet being covered with perpetual snow. On the east the Sierra Nevada stands a great wall, linking the towering dome of Shasta and Lassen Butte, a volcanic cone over 10,000 feet high. To the west is the Coast Range, less lofty, but even more sharp and craggy in contour than the Sierra. The dark green of the coniferous forests that cover the lower slopes of these mountains contrasts strongly with the fields of snow that rest on their summits.

Dr H. Latham gives the following graphic description of Tehama climate, and the causes for its peculiarities:

"The climate of Tehama County is one of the great advantages which it has to offer the home-seeker and health-hunter. It is hard for an Eastern person to believe that here, on and even above the 40th parallel of north latitude, there is a country with a winterless climate, where all the semi-tropical productions mature, and flowers bloom in the open air every month in the year; while he, living no farther north, has six months winter, several feet of snow and ice, and fierce chilling blasts. For the benefit of such Eastern people, the causes of our climate are here briefly given. There is a river in the ocean, says Maury, in his luminous description of the Atlantic. That river is the Gulf Stream, which rises on the equator, and, sweeping across that ocean, washes the western shores of Europe. It gives England and Ireland, in their northern home, the climate of the middle temperate zone. It makes Liverpool warmer in winter than New York, a thousand miles farther south. It makes France a land of vine and ivy, in the same latitude as the ice-bound Gulf of St. Lawrence. There is a river in the Pacific Ocean larger and more potent than the Gulf Stream. It rises on the equator, under a burning, torrid sun, and, sweeping north and around the earth's great circle, washes the whole coast of Northern California. From this heated river of the ocean the warm, balmy breath of the tropics comes, and confines winter to the higher altitude of the mountain regions, and gives the lower altitudes over to the fig, the orange, the olive, and the pomegranate.

"There is a further geographical cause of this climate besides the ocean current. The sweeping blasts from the ice and snowfields of the arctic regions produce the intense winters of the northern temperate zone the world around. The freezing north winds of Europe and the Eastern States, and the terrible blizzards of the Mississippi and Missouri Valleys, leave the arctic region. The effects of these cold winds are felt as far south as the Rio Grande. Texas and New Mexico have had northers that have killed thousands of cattle. These arctic winds are completely shut out of California. At the extreme western point of the Alaskan peninsula, 1,500 miles west of San Francisco, there is the commencement of a giant mountain barrier, which runs southeast for 500 miles, and thence south to and into Mexico. This great and continuous barrier deflects the arctic winds to the East, and gives California a complete protection from them.

"The influence of these two great agencies—the ocean current and the mountain barrier—is to be seen in the case of Auburn and Truckee, on the Central Pacific Railroad. These two points are only 80 miles apart, Truckee being on the eastern side of the mountain barrier and Auburn on the western side. Truckee, subjected to the arctic winds, and deprived, to some extent, of the influences of the warm ocean currents, grows semi-tropic fruit, and has yards and gardens embanked in flowers all through the winter. These are the influences that give Tehama County a winterless climate. Her mean annual temperature is 63° F. The monthly mean temperatures are as follows: January, 45°; February, 49°; March, 55°; April, 59°; May, 66°; June, 78°; July, 83°; August, 80°; September, 75°; October, 62°; November, 54°; December, 47°. The lowest temperature ever recorded in the valley portion of the county is 19° above zero. The average number of clear days in the year are 225.

"The average annual rainfall in the county is about 30 inches, which is more than falls farther down the valley. This large rainfall is very important to the agriculturist. It not only insures a much larger crop on the same kinds of soil, and with the same tillage, but insures against crop failures, as half that amount insures a fair crop. Half the rainfall of Tehama is more than the average amount of rain in some other portions of the State.

"The settlers of California are mainly Eastern people, and they still follow the habits of the people in the north temperate zone. They still speak of spring, summer, autumn, and winter as though we had those well-marked seasons here. The use of these terms is misleading to the Eastern mind. It should be understood that we have only two seasons in the Sacramento Valley—spring and autumn. The temperature is always so mild that with moisture vegetation would grow the whole year. The first rains of autumn bring spring, and everything bears the vernal green and brightness of that season so long as the rain lasts. When the rains cease, which is usually about the 1st of June, then everything takes on the appearance of autumn, and the whole country wears autumn colors till the rain comes again in November. There have been flurries of snow, but there has been no snowfall since the American occupation that outlasted a day's sun, and usually the snow melts as fast as it falls. In the temperatures, rainfall, winds, and the number of clear, bright days, there is no locality on this coast more favored than Tehama County.

"Tehama County embraces some of the finest soils in the State. They are mainly alluvial and volcanic in their origin. The Sacramento River, or its ancient predecessor, has deposited on either bank wide stretches of rich alluvium. On the east side is a dark brown, almost black, sandy loam, many feet in depth. Still eastward the land rises into slightly rolling hills of reddish soil, which soon run into the rough untillable lava beds. On the west bank the plain of tillable lands is wider. The soil on this side is in considerable part of a reddish tinge. The chief characteristics are the loamy river lands merging into a clayey loam second bottom; then the sandier soil of the plain, varying in color from gray to brown and red; then the roll of the hills begins, with reddish soil and gravelly loam predominating; next the bald hills of gray, brown, red, sometimes black, clayey loam, commonly called 'adobe' hills, and still westward the hills rise higher, carrying a similar clayey loam covered with trees and underbrush abundant for firewood and not difficult to clear; and last, the elevation reaches the pine-clad summit of the Coast Range. The bottoms along the different creeks that flow into the river have their several peculiarities; but the usual soil, especially on the west side of the valley, is a yellowish alluvium, the area being generally not very wide, and joining more elevated benches of the soils already described. North of Red Bluff the soil undulates to the river banks, and is chiefly of a reddish clay and gravelly loam, and the wooded growth is more general.

"There is very little waste land from the foothills of the Sierra to the foothills of the Coast Range. The beds of the streams constitute the greater portion of it. The different grades of soil will be viewed by different persons with widely varying opinions respecting their merits for profitable culture, yet there is very little doubt that all the soils, from the river bottoms to the coarsest gravelly hills, will be found available for some kind of husbandry. There is but very little of these lands that does not show a natural growth of trees and grass, indicating a soil ready to reward the intelligent cultivator. Large crops of grain, yielding as high as forty and more bushels to the acre, both on the bottom, the adobe hills, and the plains between, have fully demonstrated the fertility of all classes of the soil."

In regard to horticulture in Tehama County, P. H. Coffman writes:

"With all our great advantages, we can boast without stint of our capabilities in the production of fruit. Growing side by side we have the lemon and peach, the olive and apple, the orange and pear, the citron and watermelon, all in the open air, asking and needing no protection from the weather or climate. Not only do these fruits and many more grow here, but they grow well, due to the peculiar topography of the county, the soil, and the climate. One grand advantage we possess, is that our fruits all grow without irrigation, requiring no care other than good cultivation, a requisite, also, where irrigation is practiced; still, we claim that the fruits thus naturally grown are better in size, shape, color, and flavor than those grown elsewhere in the State. There is a crisp firmness about our peaches, apples, and grapes peculiar to this county itself, which gives the fruit better preserving properties in shipment or for market. Our farmers, who have given their attention heretofore solely to grain growing and stock raising, are not as well versed in fruit culture as, with the advantages we possess, is desirable; but, with new lessons, they are steadily learning what has long been neglected, and the vast sales of fruit trees of the past three years will in a short time to come result in orchards, proving that Tehama County excels in other branches of industries than those heretofore followed. When the first settlers set eyes upon the great tracts of land on each side of the Sacramento River, from Red Bluff to Stony Creek, and from one range of mountains to the other, it was a waving field of oats, so thick in growth and so high that one on horseback would be concealed; and this fact alone was sufficient to prove to the great numbers who are now following, that a region of great fertility exists in Tehama County.

"At present the great fruit-growing district is along Deer Creek, whereon are situated some forty large gardens. The main product is peaches, cherries, plums, apricots, nectarines, pears, and figs, and all diciduous fruits, which grow abundantly. Irrigation is practiced in that vicinity, and the land is rich. Clingstone peaches from Deer Creek are rich in flesh, flavor, and color, and some measured fifteen inches in circumference, capable of lasting several weeks in the open air after plucking. Peaches of a similar variety have been grown without irrigation on Reeds Creek, fully as large, and equaled the Deer Creek fruit in color, flavor, and preserving properties.

"All the varieties of grapes can be abundantly and profitably grown here. For the cultivation of the raisin grape, our soil rivals the very best in the State. Bartlett pears of the best quality are produced freely, and will be a very profitable crop. Much attention is being given to the cultivation of prunes, which will be one of the chief fruit products of the county, as well as one of the most profitable. Irrigation is not necessary to the growing of good fruit, and many think it even undesirable.

"Developments of the past few years have proved that our foothill lands are especially well adapted to growing fruits, particularly those above enumerated, and oranges hold as firm as any. These facts have induced our land owners to believe that citrus fruits are adapted to this county. They grow without much care, there being no need of protection from climatic influences. The result is that there are but few places in the county without orange trees, and this year a large number will be set out. Heretofore, oranges, lemons, pomegranates, figs, and similar semi-tropical favorites have been planted in grounds for ornamentation, and their extraordinary development has proved that they may be planted for commercial purposes as well as beauty.

"Figs are remarkably prolific in the county, often three to five crops maturing each year. Like oranges, no commercial value has been placed upon them in the past, the large beautiful leaves of the trees being admired for their novelty and shade, and figs could be obtained for the mere trouble of picking. Figs are easily grown, a few years developing a large tree from an ordinary slip.

"Apples do not prosper as well on the bottom lands as in the foothills and mountains. Those from the latter regions are as good as the best grown in Oregon for taste, flavor, and color, and are better in size, and will keep for months after picking. In the mountains apples ripen as early as May, and keep ripening through the various varieties until about the first of November, and yet attention to diversified species has not been given until very recently. The winter apples are really beautiful, the rich golden or crimson sheen as bright as the highest polished rosewood, while the flesh is white, firm, and unspotted. Spitzenberg, Bellflower, Baldwin, and June apples have been and will long remain the favorites.

"What has been said of the above fruits might be aptly said of all. We have seen a branch from a plum tree, about three feet in length, which had one hundred and thirty plums clustered as close as it was possible for them to grow. It is no rare occurrence for orchardists to pluck blossoms from the branches of peaches, apricots, almonds, and other like fruits, to save the trees from the great weight of the fruit. Fertilization has not been considered to any extent, growers depending solely upon the virgin richness of the soil after cultivation; in fact, many times the rich manure of the barn has been thrown into some gulley to fill it up, rather than scattered over the ground.

"Besides fruits proper, we have those species which are classed under the head of nuts, vegetables, and berries, and they do as well as the fruits. There are more peanuts raised in Tehama County than elsewhere in the State, the annual product being about 1,000,000 pounds. Almonds grow early, and are of superior quality, both hard and softshell. Walnuts of the English and American species are generally used for shade trees; the fruit grows large, and is sweet and juicy. All the small berries grow in profusion—strawberries, raspberries, blackberries, the latter indigenous to the soil. Wild grapes and elderberries grow in all parts of the county along the creeks, and the grapes may be gathered for jelly as late as January. Strawberries do not continue during a great part of the year, for want of proper culture, but those grown reach an enormous size.

"There are some fruits and plants which have been grown for ornamentation, which show that our soil and climate are well adapted to their culture. For instance, citron trees have grown without protection in Red Bluff. Olives have matured in several parts of the county.

Hickory and chestnuts are common as curiosities, while magnolias, acacias, oleanders, palms, and Japanese persimmons are seen to a greater or less extent in all gardens. Yet we can see in the same gardens the cypress, elm, locust, pine, mulberry, and poplar. Where under the sun can such a variety of climatic extremes, as shown above, be seen? Florida with its oranges, France with its grapevines, the East with its peaches and apples—we can excel all in their best productions in Tehama County. And still, with a million acres of tillable lands we have but about 16,000 men, women, and children to occupy them."

The chief fruit sections of Tehama County are: Vina for peaches, apricots, and prunes; Tehama, peaches, apricots, and prunes; Thomes Creek, pears, peaches, and apricots; Antelope Valley, pears, peaches, apricots, and olives; Battle Creek, pears, apples, prunes, and peaches. Besides the varieties named, all deciduous fruits, and in some localities citrus fruits, do well. Cherries are not grown to any great extent, but almonds are growing rapidly in popular favor. The principal markets are found in the East, and large shipments are made from Tehama to Boston, New York, and Chicago. Shipments of fruit made last season arrived at Boston in excellent condition. A carload of prunes was shipped direct from Red Bluff to New York, and another car to Chicago. Some fruit is shipped green, but the crop is principally dried. It is claimed that apricots will ripen a month earlier in Tehama County than in most of the coast counties, and are ready for shipment East as early as July 1st to 10th.

For drying fruit, Tehama possesses great advantages in the way of climate. The apricot, peach, and prune crop are dried in the sun, apricots and peaches drying with two days' exposure to the sun on the tray.

The following prices were paid during the last two seasons for fruit at Red Bluff:

	1891.	1892.
Apricots	8½c.	11c.
Peaches	5½ to 6c.	----------
Prunes	6½c.	----------
Green apricots	1¼c.	----------

Tehama, in the past, has been a wheat county, but it is rapidly changing to a horticultural county. During the past few years a very extensive acreage has been set to fruit. Among other large plantings are Governor Stanford's Vina fruit ranch of 2,000 acres; at Cottonwood Creek, A. T. Hatch, 500 acres; Carnell, Fitzhugh & Hopkins, 250 acres; at Red Bluff, N. P. Chipman, 446 acres; A. T. Hatch, 80 acres; at Thomes Creek, J. Eddy, 40 acres; William Duncan, 60 acres; John Flournoy, 50 acres; J. S. Cone, 300 acres, and sundry orchards, over 1,000 acres.

The crop of the present season is light—apricots and prunes not more than one third, peaches fair, pears averaging fair to middling, and in some localities total failures are reported. This was due to the lateness of the spring, combined with the severe frosts experienced during the preceding period.

Acreage and Variety of Fruits in Tehama County.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	38	48	86	12
Apricot	243	331	574	107
Cherry	25	34	59	8
Fig	33	92	125	76
Olive	10	97	107	43
Peach	2,102	1,080	3,182	213
Prune	600	728	1,328	240
Pear	221	296	517	83
Quince	12	....	12	....
Lemon	....	2	2	....
Orange	2	13	15	6
Nuts—Almond	55	311	366	121
Walnut	4	26	30	6
Raisins	607	....	607	....
Table grapes	310	....	310	....
Small fruits	40	....	40	....
Totals	4,302	3,058	7,360	915

TRINITY COUNTY.

Trinity County is bounded by Siskiyou on the north, Shasta and Tehama on the east, Humboldt on the west, and Mendocino on the south. It is oblong in shape, its greatest length running north and south for 90 miles, while its width from east to west, at its widest part, will not exceed 55 miles. Its area is 2,625 square miles, or 1,680,000 acres, all included in mountains. Mountain barriers inclose the county on three sides. Upon the north lie the Scott Mountains, upon the east the Shasta, and upon the west the Coast Range. These extend their spurs into all portions of the county, leaving but a small part of its area free from their contact; the entire surface of the county is, in consequence, broken, rugged, and precipitous. To this formation the county is indebted for its abundant water supply, and it is watered by numerous streams, all having their sources in the county, and flowing eventually into the ocean on the west. Trinity River, the largest of these, rises in the north, flows southward for about 40 miles, and then turns sharply to the northwest, receiving in its course the waters of many tributaries. The southern part of the county has also many streams, and is a mass of high, rugged mountains.

Weaverville, the county seat of Trinity, has an altitude of 2,000 feet, and its climate differs little from that of other places of like altitude. In the summer the mercury will get well up in the nineties, and occasionally reach as high as 105° or 106°, but this is rare. The nights are always cool. The winters are cold for California, and frosty nights are not uncommon, the mercury sometimes touching 10° above zero, which is the lowest recorded. Owing to the altitude of the county at all points, the atmosphere is dry and pure, and the extremes of heat and cold do not cause so much discomfort as they would in less elevated regions. There is an average rainfall of 46 inches a year, the smallest precipitation recorded being in 1874–75, when there were 24.72 inches, and the heaviest in 1877–78, when 63.95 inches were reported.

Trinity is essentially a mining county, and but little attention has been paid to horticulture. Hay Fork Valley is about 10 miles long and from 1 to 2 miles wide. Through it runs Hay Fork and Salt Creeks, and there are numerous springs in it. Trinity Valley is about 18 or 20 miles long and from half a mile to 2 miles in width. The Trinity River passes through it. These are the two largest valleys in the county, and outside of these the agricultural land is generally found in small patches. Some fruit is grown for home consumption, and apples, pears, and plums do well. Berries of all kinds thrive and yield abundantly.

Trinity is not a fruit-growing county, but along the streams, rivers, and in the mining towns and stock ranches are small family orchards, the chief of which are found at Weaverville, Junction City, and the surrounding vicinity. W. H. Louden, near Weaverville, has the largest orchard in the county. This is 20 acres in extent, and was planted in 1854, and has been in continuous bearing since 1860. The fruit grown there consists of apples, pears, and the more hardy varieties of deciduous fruits. Some berries, almonds, and walnuts are also grown in this county; but little fruit finds its way to the outside market, that grown being consumed by the mining camps and the people of the county. Some small quantities of apples are exported, which find their way to San Francisco, but these are so limited in amount as to cut no figure in the market.

Acreage and Variety of Fruits in Trinity County.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	22	20	42	4
Apricot	2		2	
Cherry	2		2	
Peach	25	10	35	
Pear	20	30	50	5
Plum	3		3	
Nuts—Almond	1		1	
Walnut	20		20	
Table grapes	60		60	
Small fruits	30		30	
Totals	185	60	245	9

TULARE COUNTY.

Tulare County is bounded on the north by Fresno, on the east by Inyo, on the south by Kern, and on the west by Fresno and Monterey Counties. Its territory extends from the summit of the Sierra Nevada Mountains on the east to the summit of the Coast Range Mountains on the west, varying in width north to south from 50 to 60 miles. The greatest length of the county east and west, from the summit of one range to the other, is about 140 miles. The valley proper contains 1,136,000 acres; the lower foothills, 249,000 acres; the mountainous portion of the Sierra Nevada, 2,086,800 acres, and the Coast Range Mountains, 128,000 acres.

Several years ago Tulare Lake covered 166,400 acres of land, but owing to the diversion of water from the numerous rivers that empty into it, which has been taken out for irrigation purposes, at least one third of the land has been redeemed from overflow. Levees have been built and the land reclaimed for agricultural purposes.

The average elevation of the plain lands above sea-level is about 300 feet. There are 256,000 acres of timber lands on the plains, the timber being almost entirely oak, with an intermixture of cottonwood.

The mountain portion of the county comprises about one fifth of its total area. The Sierra Nevada Mountains reach their greatest height and grandeur in Tulare County, culminating in the lofty peak of Mount Whitney, which rises to an altitude of 15,056 feet. From Mount Whitney the summit-line of the range gradually lessens in height toward the north, but more rapidly toward the south. The average height of the range in Tulare County is about 8,000 feet, and the distance from base to summit is not more than 60 miles. The mountains, in their higher altitudes, are covered with extensive forests of pine, fir, cedar, tamarack, and the famous redwood trees. The lower foothills are covered with white-oak forests, which are principally valuable for the masts they produce. In the mountains are numerous meadows, producing nutritious grasses, where flocks of sheep and herds of cattle are annually fattened. Here and there throughout the range are level pieces of land, where settlers have located, and who, in addition to stock raising, are engaged in cultivating orchards, especially in the lower foothills. As fine apples as were ever grown are produced here at an altitude of 4,000 feet. At a much lower elevation are found small coves where frosts are unknown, and here we find oranges, lemons, and various varieties of vegetables. So free from frosts are those localities that tomato vines have been known to retain their life and produce fruit for years.

The average elevation of the Coast Range is not more than 1,200 feet, and the distance from base to summit 12 miles. There are few valleys in this range, but the mountain sides produce grasses that are unsurpassed for feed.

The rivers and smaller streams that flow into the valley have their sources in the Sierra Nevada Mountains. The largest of these is Kings River, which has a drainage area in the mountainous portions of Fresno and Tulare Counties of 1,853 square miles. The other streams in the county, all lying south of Kings River, in the order named, are: Kaweah River, with a catchment of 608 square miles; Tule River, with 446 square miles; Deer Creek, 130 square miles; White River, 96 square miles; Poso Creek, 278 square miles; total area of mountain and hill drainage, 3,411 square miles. There are several very small streams intervening between the large ones mentioned that have their sources along the foothills and are fed by springs and winter rains, but which carry little if any water during the greater portion of the year. However, they are of great value to the stock raiser, who, in early days, settled on and laid claim to the lands where they have their rise or sources.

The crests of the Sierra Nevada, towering far above the line of perpetual snow, present their white-crowned summits to view for hundreds of miles. Here is the source of those numerous streams which flow through this county, giving life and fertility wherever they reach. It is nature's reservoir, and inexhaustible. During the hot summer months this snow gradually melts and keeps up the volume of water in the rivers. The supply is never exhausted, and the summer consumption always repaired by the winter precipitation.

The climate of Tulare County is similar to that of other interior counties of California. There are two seasons—the wet and the dry. The rainy season generally commences in December, though occasionally, and only occasionally, there are showers as early as September. The rainy season closes in April. There are, on an average, 220 cloudless days in the year. Owing to the extreme dryness of the atmosphere sultry weather is almost unknown. The extreme hot weather is in the months of July and August, when the thermometer ranges from 85° to 112°. To the Eastern readers, however, thermometrical readings are apt to convey a wrong idea of our climate. In the Eastern States a temperature of 90° is unendurable, and a temperature of 110° would mean wholesale death. In California 90° is comfortable, and even 112° would be endurable. The extreme dryness of the atmosphere causes the difference, the heat here being dry, while that of the East is moist and suffocating. Cases of sunstroke are unknown, and even on the hottest days men can work in the full glare of the sun without inconvenience or damage. With the setting of the sun the heat is speedily radiated, and cool, refreshing nights amply compensate for the occasional hot days. It is the warm, dry weather that gives value to this section, especially for curing the raisins and drying fruit.

The winter months are the loveliest of the year. Flowers are in bloom from the first fall rains until late in the spring or early in the summer, and the appearance of the wide plains bedecked with wild flowers of every hue in midwinter is a cheery sight. There are occasional frosty nights on the plains, but the frost is not severe enough to check farm work. Ice forms occasionally from the thickness of a pane of glass to half an inch, but it disappears with the morning sun. Snow has fallen in the valley, but such a thing is so rare that citizens, generally, are not able to state the date on which a snow storm occurred.

The following table will give a pretty good idea of the climate of Tulare County. It was kept for Visalia, and will differ but little in other parts of the county:

Date.	Rainy Days in Month.	Rainfall for Month.	Highest Thermometer.	Lowest Thermometer.	Average Thermometer.	Highest Barometer.	Lowest Barometer.	Clear Days.	Cloudy or Hazy Days.
1888—January	6	3.05½	60	27½	44.16	29.93	29.27	15	16
February	2	.16	64	46	55.10	29.80	29.39	16	13
March	7	1.61	68	52	57.96	29.70	29.42	14	17
April	1	.14	94	60	75.93	29.80	29.45	23	8
May	0	.00	95	70	80.03	29.58	29.41	22	9
June	0	.00	104	84	89.00	29.70	29.36	24	6
July	0	.00	106	92	97.00	29.55	29.38	30	1
August	0	.00	107	93	100.00	29.55	29.39	30	1
September	1	.35	106	80	98.00	29.59	29.60	29	4
October	0	.00	88	72	80.00	28.67	29.47	19	12
November	5	2.39	75	57	65.00	29.65	29.31	6	25
December	5	1.70	58	48	54.00	29.77	29.44	1	20
1889—January	3	.70½	63	44	51.51	29.76	29.14	15	13
February	2	.36	70	49	62.96	29.70	29.40	16	12
March	7	3.45½	82	59	71.96	29.77	29.08	20	11
April	2	49	92	62	77.26	29.69	29.45	17	13
May	2	1.22	99	61	83.70	29.70	29.37	23	8
June	0	.00	101	87	96.20	29.53	29.31	15	15
July	0	.00	106½	92	99.08	29.60	29.32	31	----
August	0	.00	105	90	95.96	29.60	29.32	15	16
September	0	.00	100	80	91.46	29.75	29.40	15	15
October	6	4.08	92	59	72.22	29.77	28.31	14	17
November	5	.66	67	56	62.93	29.85	29.41	10	20
December	19	3.21	64	48	56.35	29.90	29.39	8	23
1890—January	8	3.34	58	40	49.64	29.94	29.41	16	15
February	6	1.12	65	46	56.64	29.97	29.42	12	16
March	6	1.10	75	51	64.00	29.99	29.43	17	14
April	2	.25	86	64	72.90	29.80	29.45	17	13
May	3	.46	98	66	81.80	29.80	29.41	17	----
June	0	.00	97	74	87.63	29.72	29.42	22	8
July	0	.00	104	89	96.06	29.62	29.30	30	1
August	0	T.	101	86	95.03	29.66	29.37	14	17
September	3	.73	95	70	86.83	29.65	29.38	11	19
October	0	.00	81	65	75.87	29.74	29.41	13	18
November	2	.51	77	52	66.60	29.79	29.41	15	16
December	6	2.36	65	41	50.83	29.98	29.60	----	31

Rainfall for 1888, 9.40½ inches; rainfall for 1889, 14.18 inches; rainfall for 1890, 9.87 inches.

The soil of Tulare County varies in character. Along the foothills, or on what may be termed the bench-lands, it is a red loam, as a general thing, though there are places where the soil is black adobe. Along the base of the foothills the soil is reddish. In the '76 country, south of Kings River, the land is what is known as "white ash." Farther west it is more sandy, with occasional beds of alkali. Tulare Lake lands are sandy, intermixed with considerable organic matter. In the delta of the Kaweah River the soil is a deep alluvium, with firmer soil here and there. With its variety of soil no county in the State can show so large a body of productive land as can Tulare.

There is a strip of land along the base of the foothills of the Sierra Nevada Mountains where oranges may be grown, as has been demonstrated both at the north and south ends of the belt. These lands are also valuable for growing the raisin grape. The red lands, and in fact all the territory of the county outside of the bottom lands and the timber belt, are peculiarly adapted to the raisin grape. The raisin grapes grown in Tulare County are exceedingly large, of fine flavor, and contain all the properties that go toward making a first-class and marketable raisin. The timber belt and bottom lands are better adapted to the table grape.

As early as 1853 two or more irrigating canals had been constructed to bring water to the lands in the vicinity of Visalia. These ditches demonstrated what Tulare land would do under water, and the evident fertility of the land wherever water was put appealed to intending settlers and gave an impetus to settlement. In 1873 a large immigration began to the county. The new-comers were people of enterprise, and immediately on their arrival commenced the construction of irrigating canals, until to-day there are more than 500 miles of main water ditches in the county, with probably an equal extent of small branches.

The '76 Canal, now the property of the Alta Irrigation District, obtains its water from Kings River, at a higher point than other canals taking water from that stream. The main canal is 35 miles in length, and supplies lateral canals of the same length. It was constructed at a cost of about $200,000, and will irrigate 200,000 acres of land. When this canal was under the control of private individuals it cost $1 per acre per annum to irrigate lands under it. It is now estimated that the same canal, under the control of the irrigation district organized under the Wright Act, can supply water at 50 cents per acre per annum, and at the same time irrigate a much larger territory.

There are five other ditches, or canals, taking water out of Kings River for irrigating lands lying west of the '76 Canal, and in what is known as Lucerne Valley (formerly called Mussel Slough). These are the People's Ditch, 32 miles in length; Mussel Slough Ditch, 20 miles; Last Chance, 31 miles; Lower Kings River, 21 miles; Rhodes Ditch, 10 miles. The aggregate cost of these five ditches is estimated at $220,000. The Lakeside Ditch, constructed to convey water along the eastern boundaries of the same territory, obtains its waters from the St. Johns River, and is 32 miles in length, and cost $50,000.

Lucerne Valley, watered by the six canals last mentioned, contains 115,000 acres of irrigable lands, at least three fourths of which are now receiving water from the ditches named.

There are fourteen or fifteen canals diverting water from the Kaweah River. A number of these were constructed with plow and shovel, long before approved appliances for ditch building came into vogue; hence, it has been impossible to ascertain the actual cost of many of them. Among those more recently constructed are the Watchumna, carrying water to lands west of Visalia, and the Kaweah Canal, that carries water to the vicinity of Tulare City.

Ten years ago the fourteen ditches leading out from the Kaweah River were used to irrigate less than 25,000 acres of land; to-day these same ditches are carrying water over at least three times that area.

The waters of the Kaweah River proper empty into numerous other streams, among them Cross Creek, Mill Creek, Packwood Creek, Deep Creek, and a number of sloughs, from whence they are diverted into ditches or canals and carried from 4 to 10 miles to dry lands. There are about 215,000 acres of irrigable land under the watershed of the Kaweah and the streams debouching therefrom, and the past two seasons have satisfied the people that there is water enough to irrigate every foot of this when it is properly and carefully handled.

There are thirteen canal companies taking water from Tule River, but there are less than 12,000 acres of land being irrigated by its waters. The water of Tule River is not perennial, and much of it is wasted by seepage. There are about 138,000 acres of land that should properly be irrigated from this source. Two irrigation districts are now in process of formation, under the Wright law, and two years hence, it is confidently believed, enough water will be had from Tule River to irrigate nearly all of the land in the district, which extends from Porterville on the east to Tulare Lake on the west, and from Lindsay on the north to a point midway on the south between Porterville and Deer Creek.

Deer Creek is a small stream, and its waters disappear, as a general rule, in June and July, except at a point well up in the foothills. The principal canal diverting water from this stream is the Sausalito Ditch, constructed about seventeen years ago for the purpose of carrying water to a point 12 miles west from where the waters enter the plains. This ditch covers less than 2,000 acres of land, and it is probable that not more than 2,500 acres of land are watered by Deer Creek.

An irrigation district has been formed to utilize the waters of Poso Creek, and the day is not far distant when the waters of that stream, as well as those of White River, will be used for irrigating the lands east, northeast, and southeast of Delano.

It will be seen from the above that Tulare has at last awakened to the importance of her water resources, and is making rapid advance in their development. It is but a few years since the people of this county were skeptical with regard to the possibility of getting sufficient water to irrigate any great body of the arid lands which surround them. The experiments so far made have amply demonstrated that there is in this county ample water for all purposes when it is properly husbanded and distributed. Too much water was formerly used, when it was considered necessary to soak land for days or weeks to make it productive. In the older irrigated districts it is found that continuous irrigation saturates the land, and where a few years since surface water could not be found at less depths than 20 to 25 feet, it is now found at 6 and 8 feet, and in some cases at even less depth. In many places, instead of the question being one of irrigation, it has now become one of drainage.

Artesian wells to the number of about two hundred have been bored in that part of the county lying west of the main line of the Southern Pacific Railroad, and extending from Lemoore, north of Tulare Lake, in a half circle to Pixley, which lies east of Tulare Lake. The full extent of this artesian belt is about 700 square miles. The first well was sunk in 1879, at Tipton, by the Southern Pacific Railroad Company. In boring this well, washed soil, or debris, was found at a depth of over 70 feet, and fish bones and pieces of wood were brought up from a depth of 80 feet. No rock is encountered in boring these wells, strata of gravel and clay succeeding each other from the surface to the greatest depth. The depth of the wells varies from 300 to 600 feet, though there are several which are 800 feet deep. The mean average depth between the shallowest and deepest well is about 450 feet. It is claimed for some of these wells that they have a flow of water sufficient to irrigate 160 acres of land. The average artesian well costs from $800 to $1,000.

IRRIGATION WORKS IN TULARE COUNTY.

Name.	Miles.	Assessed Value.
Kaweah Canal and Irrigating Co.	25	$7,500
Consolidated People's Ditch	4	8,000
Last Chance Ditch	10	15,000
Kaweah and Mill Creek	5	5,000
People's Ditch—main canal	7	14,000
People's Ditch—branch	12	1,200
People's Ditch—branch	8	400
Lower Kings River Ditch	14	7,000
Guffes' Side Ditch	5	500
Settlers' Ditch	15	1,500
Extension Ditch	3	1,500
Lakeside Ditch	25	5,000
Mussel Slough Ditch	3½	7,000
Pioneer Ditch	16	32,000
Totals	152½	$103,600

Tulare County holds a place in the front ranks of the horticultural counties of the State, and nearly every variety of fruit grown in the State can be found within her borders. Of deciduous fruits, apples, plums, pears, cherries, peaches, apricots, nectarines, prunes, and figs all do well. In the Lucerne district, including Hanford, Lemoore, and Grangeville, are numbers of very large and profitable deciduous orchards, the fruit from which excels in size and flavor, and the yield of which is very large. In grapes, too, this county excels. At Tulare City, or rather in the country tributary to it, there are also extensive areas in deciduous fruits and raisin vines, and it is here that the celebrated Paige & Morton vineyard and orchard, one of the largest tracts under fruit in the State, is located. At Visalia are also extensive orchards devoted to the growth of deciduous fruits. Around Traver, also, numerous large orchards are found. Toward the foothill region citrus fruits do equally well with the deciduous varieties, and in Orosi, Dinuba, Porterville, Plano, and the country between, are a number of very thrifty orange and lemon orchards. On the Pogue ranch, on the Kaweah River, is an orchard of old lemon trees that have been in bearing for a number of years, the fruit from which compares favorably with the best imported article. Nuts do well and yield profusely. For berries of different kinds, the soil and climate of Tulare seem especially adapted.

Of apples, many of the earlier varieties do well in the valley, and the later varieties in the foothills and mountains. Among the favorites grown here are the Winesap, White Winter Pearmain, Ben Davis, Rhode Island Greening, and Roman Beauty. Other varieties do well in the higher foothills, and the fruit is of excellent flavor.

Pears are grown successfully in all parts of the county, except in districts where the soil is strongly impregnated with alkali. The tree is long-lived, bears early, and yields very abundantly. The Bartlett is the favorite variety. The Winter Nelis, the Beurré Clairgeau, and Easter Beurré are largely grown, and are among the best shippers.

Peaches do well in all parts of the valley except on the alkali flats. Every variety does well, and Tulare peaches are celebrated for their size, flavor, and earliness. With the exception of Vacaville, and one or two other especially early localities, Tulare has her fruit first in market. At the State Board of Trade rooms, in San Francisco, Tulare County, among her other products, has some remarkably large peaches on exhibition, surpassing in size those of any others exhibited there.

Apricots in Tulare County are an almost certain crop. They flourish in valley and foothill alike, and like other fruit there, bear young and come into market early.

Prunes do wonderfully well. Some of the stories told of prune orchards in that county seem bordering on the fabulous. From one seven-year old tree over 1,100 pounds of fruit, by actual weight, were gathered in one year, and 700 to 800 pounds is no uncommon yield. The trees begin to bear at three years old, and an average yield from a seven-year old orchard is 600 to 700 pounds to the tree. The great trouble experienced in this branch is liability to sunburn during the hot days, when fruit exposed to the direct rays of the sun becomes scorched and damaged.

Cherries do best in the foothill sections, and figs grow almost anywhere.

In citrus fruits Tulare is rapidly assuming a front position, and bids fair to share the honors in this line with Riverside. All along the foothills, where water can be obtained, oranges thrive. There are no damaging frosts or destructive winds, and at Porterville there are a number of fine orchards which have proved so profitable to their owners that large areas of new land are now being planted to citrus fruits in that section.

Tulare County holds a position in the front rank of fruit-growing counties in California. Every section of this county, except the mountainous portion, is adapted to fruit culture, and nearly every variety of fruit is grown there. The principal sections and favorite varieties are: Visalia, prunes, peaches, and plums; Hanford, raisins, prunes, and peaches; Lemoore, raisins, prunes, peaches; Grangeville, raisins, peaches, prunes, and pears; Traver, raisins, pears, figs, peaches, and prunes; Woodville, apples, pears, peaches, and figs; Farmersville, apples, peaches, and pears; Orosi, raisins, peaches, prunes, apricots, and oranges; Porterville, oranges, raisins, lemons, prunes, and peaches; Limekiln, raisins, limes, and oranges; Plano and Pleasant Valley, oranges, lemons, and peaches.

Besides the varieties named, there are grown, to a smaller extent, nearly all known varieties of deciduous fruits and nuts, including plums, nectarines, almonds, walnuts, pecans, guavas, and, to a limited extent, the smaller fruits.

There has been a very great impetus given to fruit growing in Tulare County in the past few years, owing to the enormous output of the orchards in that section. Fully 50 per cent of the orchards now planted there are not yet in full bearing, about 20 per cent being planted during the season of 1892. The output of fruit for Tulare County is consequently small, when compared with the acreage and the cultivation. The principal fruits exported are raisins, prunes, peaches, and apricots.

There were shipped from Tulare County in 1891 sixteen cars of raisins and three cars of other dried fruits.

ACREAGE AND VARIETY OF FRUITS IN TULARE COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	104	43	147	10
Apricot	350	374	724	82
Cherry	1	5	6	3
Fig	50	132	182	91
Olive	30	290	320	130
Peach	2,160	1,640	3,800	522
Nectarine	56	72	128	30
Prune	1,971	3,150	5,121	967
Pear	350	292	642	58
Plum	37	52	89	12
Lemon	12	51	63	47
Orange	50	521	571	370
Nuts—Almond	3	4	7	1
Walnut	4	8	12	3
Raisins	10,264	----------	10,264	----------
Totals	15,442	6,634	22,076	2,326

TUOLUMNE COUNTY.

Tuolumne County is situated on the western slope of the Sierra Nevada range, between the parallels of 37° 40′ and 38° 20′, and is bounded on the north by Alpine and Calaveras Counties, east by Mono County, south by Mariposa County, and west by Stanislaus and Calaveras Counties. A line drawn due east from San Francisco will touch the southernmost limits of Tuolumne, the county seat of which is distant from the metropolis 150 miles. The established boundary lines of Tuolumne are of such varied angles and with so great a divergence from the cardinal points that the territory it embraces takes the form of an irregular polygon. Tracing its boundary lines, commencing with the eastern at Mount Lyell, it traverses the crest of the Sierra Mountains to Castle Peak, a distance of 40 miles; thence the northern boundary line west 45 miles to the north tributary of the Stanislaus River; thence its western line 50 miles south, following the course of that stream to its junction with the main river, and along this to a point 5 miles above Knights Ferry; thence southerly 20 miles to the Tuolumne River. Leaving this point, its southern boundary corresponds nearly with the 27th parallel, a distance of 60 miles east, though very irregular; thence in a southeasterly direction 25 miles to the place of beginning, which forms an arm extending south 20 miles, varying in width from 8 to 10 miles. The county has an area of 1,953 square miles, or 1,256,000 acres.

The eastern portions of the county extend into the westerly slope of the Sierra Nevada Mountains, and the entire surface may be said to possess a rugged character, with many small and fertile valleys and gently sloping hillsides. One of the most remarkable topographical features of Tuolumne is Table Mountain, which extends for a distance of between 20 and 30 miles along the northwestern boundary.

The great mass has an almost level top, and its perpendicular sides, rising to a height of upwards of 2,000 feet above the bed of the Stanislaus River, are visible as a striking and wonderful formation from the road over which the stage passes in going to Sonora. Table Mountain was built up by a lava flow, which first filled an ancient river channel, and continued to rise above it until the existing mass was formed. On the confines of the county, in the Sierra Nevada, are Mount Dana and Castle Peak, the former rising to a height of 13,227 feet, and the latter having nearly as great an altitude.

The rivers of the county are the Stanislaus and Tuolumne, which form tributaries to the San Joaquin. The Tuolumne has its source entirely within the limits of the county, and may be justly termed the river of a thousand lakelets, although a number of these strictly come under the head of lakes, the larger being from one half to 2 miles in length. The main or principal branch of the river flows through the Hetch Hetchy Valley, which is situated 50 miles east of the county seat. This branch, with its many tributaries, commands about three fourths of the entire watershed of the county, though its main sources are in its eastern part, and to which the many lakes in that locality give rise.

The Stanislaus River flows through the northwestern part of the county, and with one of its tributaries forms the west boundary line. From the south fork of this stream the Tuolumne County Water Company's canal receives its supply of water, which is conducted through a system of ditches, flumes, and iron pipes a distance of 20 miles, and thence through the distributing ditches and flumes to all the important points in the county, for mining, manufacturing, and irrigating purposes. The construction of this aqueduct cost, in all its details, close to half a million dollars, and the county has derived great benefit from it, more in former years than at present, as the hydraulic method of mining, in the success of which it was a vital factor, is virtually suppressed by law. Lake Elnor, the largest of the group of lakes, and which forms one of the principal sources of the Tuolumne River, is situated in a valley 4 miles long and averaging 1½ miles in width.

Tuolumne County possesses the characteristic foothill and mountain climate. At Sonora, the county seat, the summers are hot, the thermometer ranging about 95°, with occasional days when it will reach over 100°. The nights, in common with other parts of California, are always cool. The winters are cool, with occasional frosty nights and light falls of snow in the foothills. The latter, however, does not lie long, and frost is rare. The thermometer in winter sometimes, though not often, marks below 20°. As a rule the winter months are pleasant; the days, when it is not rainy, are sunny and warm, and the nights are not as a rule uncomfortably cold. In the higher mountain levels, of course, more rigid weather in the winter prevails.

The rainfall is somewhat heavier there than in the San Joaquin Valley, the record for the season of 1888–89 showing 25.92 inches, and that of 1889–90 being 63.54 inches. This season was an unusually wet one over the whole State, and extended from October to May.

The soil of Tuolumne County is characteristic of the mountains from which it has been brought down by glacial action and the action of water. It is argillaceous in character. In the lower levels there are vast deposits of black alluvium, while on the hillsides it is gravelly, and in the higher levels rocky. The soil on the hillsides, mountain slopes, and the parallel chains of small valleys along the many watercourses throughout the county is very productive. The valleys particularly produce a luxurious growth of native grasses, and, together with the rich verdure of the gentle slopes and table-lands, furnish pasturage during the summer months for vast herds of cattle and sheep.

The water supply of Tuolumne County is ample for all requirements. Water is used there both for mining and irrigation, and is furnished by a system of dams, reservoirs, and canals owned by the Tuolumne County Water Company. The main canal of this company runs from the south fork of the Stanislaus River, from a point about 18 miles above Columbia, and extends to that town and its vicinity. This canal as originally constructed is 7 feet wide on the bottom and 13 feet deep, with an average grade of 16 feet to the mile. The main flume at the head is 7½ feet wide and 2 feet deep. This carries in the summer season 2,100 miner's inches. There are three timber dams, all on the south fork of the Stanislaus River. The lowest one is at Strawberry Flat, from 13 to 15 miles by way of the river from the head of the ditch, and about 31 miles from Columbia. A mile above is the Upper Strawberry, or second reservoir, and about 10 miles above the lower reservoir is the Big Dam. The entire capacity of the three reservoirs is equal to something over two months' supply. All these are what is known as Cob-work Dam.

About 6 miles from the head of the main canal is a lateral ditch with a capacity of 500 inches. This is 9 miles in length, and supplies the Consolidated Eureka Mine at Summersville. From this branch another ditch, beginning almost a mile below Confidence, conveys the water between 3 and 4 miles to Soulsbyville. A branch ditch from the end of the main canal runs to Bald Mountain, with a carrying capacity of 300 inches. From Columbia a branch takes up the second headwater from that district, carrying it to Jamestown, Montezuma, and the surrounding country. The same is done at Soulsbyville, where a branch takes the second headwater from the mills, runs to the lower Phœnix reservoir and connects with the ditch that supplies Sonora. From Dead Horse Mine the second headwater is carried in a branch extending towards Algerine.

There is one large tunnel on the line which runs from the south fork to the main Stanislaus River. It is considerably over a mile in length, and the cost of cutting it was about a quarter of a million dollars. A very considerable quantity of pipe was necessary in different portions of the line, amounting in the aggregate to about 7 miles. In addition to the main canals described there are many miles of distributing canals and ditches.

IRRIGATING WORKS IN TUOLUMNE COUNTY.

Name.	Miles.	Assessed Value.
Tuolumne Water Co. ditches	85	$38,250
La Grange Co. ditches	13	20,000
P. B. Smith ditches	4	1,000
O. P. Gale ditches	35	12,000
Gold Rock Water Co.		1,500
Golden Gate Water Co.		21,850
Sundry small ditches		425
Totals	137	$95,025

Fruit raising, to which the soil is admirably adapted, is one of the growing interests of the county. Semi-tropical fruits of every variety, and vines are cultivated, and yield an abundance of highly flavored fruit. The almond and walnut are quite extensively cultivated, and with encouraging results. Among the vines the Muscat, or raisin grape, is coming into favor with our viticulturists. They yield largely, and the fruit is of an extraordinary size. This branch of industry, the raising of fruit, will at no distant day stand first of the productions of the soil. There is a diversified system of farming carried on, which, in every particular, proves profitable. There being but a small part of the arable lands under cultivation, the farm products are therefore equal only to the demand for home consumption.

Far out around the town of Sonora, over the hilltops and in the valleys, stretch the orchards of peaches, apricots, pears, plums, apples, cherries, and other kinds of fruit. Peach trees are cultivated more than other kinds, and they produce as fine flavored and large peaches as can be found anywhere else in the State.

The vineyards are important in horticultural interests. The grapes are unexcelled when of the best variety; large quantities are shipped, while the poorer kinds are made into wine. The situation of the town is especially adapted to vineyards, since in some parts there are advantages of water and sunny slopes unsurpassed.

Citrus fruits are not cultivated to any great extent, although orange trees flourish, bearing at the age of five to eight years, and produce sweet, highly flavored fruit. It is thought that oranges might be quite extensively and profitably raised by those who have gardens in favored positions, sheltered from the frosts and winds.

Almond trees thrive and produce a good crop of nuts. In the early spring from hundreds of gardens in the vicinity glow the snowy almond trees, showing their great number and fruitfulness. Walnuts are also raised.

Around Jamestown the fruits chiefly grown are grapes and peaches. They are scarcely ever known to fail, and attain great perfection. In table grapes the Sweetwater, Black Ferrara, White Muscat, Flame Tokay, Black Hamburg, and Black Prince do well. All kinds of apples grow well in this district, and their flavor and appearance are equal to those of any part of the State, excepting some grown at much higher altitudes, such as the mountains above Sonora, but the crop is more sure here than in that locality. No part of the world is better adapted to the cultivation of the peach than this. This has been proved time and again. All kinds do well, from the Early May to the latest known variety. Pears do equally well with the apple and peach. All varieties of cherries do remarkably well. The plum does well and is a very sure crop; scarcely any disease ever attacks this tree, and the same is true of the prune. This district appears to be the natural home of the fig. All known varieties do well, and there are trees the bodies of which are 11 feet in circumference.

Tuolumne County is not very largely devoted to fruit growing. The principal sections in which fruit is raised are Sonora, Columbia, Tuttletown, and Jamestown, and the varieties, in order of preference, are: apples, pears, peaches, plums, nectarines, apricots, figs, walnuts, almonds, with some persimmons, oranges, and cherries. These are usually disposed of green; a small amount is dried, very little being canned, the little that is being put up for domestic use. But little fruit is exported from this county, that which finds its way into the outside world being generally dried. Some small amount of green fruit of extra fine quality is shipped out of the mountains to San Francisco.

One of the largest orchards in this county is that of McComber Bros., who have some 50 acres in fruit, principally apples, at Sonora. In connection with their orchard these gentlemen have a large establishment for the manufacture of cider and vinegar, in the making of which they consume the entire output of their own orchard and purchase large quantities from the local growers. The products of their establishment find a ready sale among the miners of Tuolumne County, and also in San Francisco and Oakland. Apples were sold in Sonora last season at from $10 to $20 per ton; for loose fruit, 2 to 5 cents per pound. Green apples delivered at McComber's Cider and Vinegar Works during the present season were purchased at from $10 to $20 per ton, according to quality.

The difference in elevation in the various parts of Tuolumne County makes a great difference in the varieties of fruit which are grown there, and affords a wide range in those varieties, from the fig, the olive, and in some cases the orange, which are found in the lower levels, to the apple, which attains perfection in the higher levels.

Some of the orchards in this county date back to the days of the gold excitement, and are contemporaneous with the history of the county. That of McComber Bros. was planted by the present owners in 1852. Jarvis Corveron planted an orchard in 1852, Mr. Haslan set an orchard in 1854, and the Comstock orchard was planted in 1855. Most of these are still in existence and bearing. The trees planted by McComber Bros. were imported from Oregon, and cost them $2 50 each.

ACREAGE AND VARIETY OF FRUITS IN TUOLUMNE COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	200	68	268	5
Apricot	20	7	27	2
Cherry	25	3	28	1
Fig	12	6	18	2
Olive		2	2	
Peach	90	7	97	3
Nectarine		1	1	
Prune	3	1	4	
Pear	58	10	68	3
Plum	3	2	5	1
Quince		2	2	
Lemon		2	2	1
Orange	1	4	5	2
Nuts—Almond	3	5	8	1
Walnut	7	6	13	2
Raisins	50		50	
Table grapes	25		25	
Small fruits	22	10	32	8
Totals	519	136	655	31

VENTURA COUNTY.

Ventura County is located between the Mohave Desert on the east and the ocean on the west, and between the counties of Los Angeles and Santa Barbara. It is bounded on the north by Kern and San Luis Obispo Counties, on the west by Santa Barbara, on the east by Los Angeles, and on the south by the Pacific Ocean. It has an area of 1,628 square miles, or 1,296,000 acres. Of this nearly 1,500 square miles are mountain and desert, valuable chiefly for their mineral products. The arable area, however, is considerable in extent, much of that regarded as desert being very fertile under water, while through the mountains are found numerous little valleys. These valleys are of every shape and extent: from the broad expanse with square miles of level land to the little pocket among the hills. The principal of these is the Santa Clara. This valley extends nearly east and west across the county, and is traversed by the Santa Clara River fed by numerous tributaries, as the Castis, Piru, Sespe, and Santa Paula. The average width of the valley is 10 miles, and immense ranches extend from one end to the other. At the upper or east end is the Camulos, with its orange and olive orchards, wine cellars, and old vineyards, made famous by Mrs. Jackson, who here wrote a part of her celebrated book, "Ramona." This beautiful valley, surrounded by "high sierras," was mentioned by Cabrillo but half a century after Columbus discovered America. Senator Sherman, of Ohio, in his recent visit to this place, said that this broad valley, with its surrounding mountains and its clear, blue sky, forcibly reminded him of Italy, but that this was on a much grander scale.

Next in importance comes the Ojai Valley, a great amphitheater, whose walls are mountains rising like citadels in all directions. Overlooking the whole is Mount Topo-topa, rising to a height of 6,000 feet. This basin is well timbered and has a very productive soil, giving the largest wheat yield per acre in the county. The Ojai Valley as a whole will attract, and that at no very distant day, hundreds of people who will engage in the raising of citrus fruits.

Other valleys are the Conejo, 1,000 feet up on the northern slope of the Guadalasca Mountains, well watered and admirably adapted for raising grain; the Simi, with its splendid oak forests and grazing lands; the Santa Ana, with its cultivated farms and orchards, its trout streams, and clumps of rhododendrons; the Las Posas, with its immense wheat fields and semi-tropic fruits; the Sespe, lying along each side of the Santa Clara River and the San Buenaventura Valley, narrow but picturesque, watered by the Ventura River, and dotted with pleasant homes.

The Santa Clara River, of which mention has been made, traverses the entire length of the county from northeast to southwest. It is fed by several tributaries which rise in the mountains near the Santa Barbara line, chief of which are the Santa Paula, Sespe, and Piru, the latter having its rise in Kern County. The Ventura River rises in the San Rafael range, flowing nearly due south, and is fed by numerous springs and mountain streams. These two rivers reach the ocean but about 6 miles apart. They furnish abundant water for irrigating purposes when needed, Ventura being one of the best watered counties in Southern California, as nearly every valuable farm in the county can be reached with flowing water.

The climate of Ventura County is adapted to a great range of horticultural pursuits, and in the different parts of the county nearly all varieties of fruit, except those of the tropics, can be produced. Near the coast the mercury seldom falls below 34°, or rises above 83°. In the valleys farther back from the ocean the weather grows hotter in the summer and cooler in the winter, the mercury sometimes reaching the freezing point in January and February, and leaving 100° behind in July and August. In the mountains snow sometimes falls in the winter months, but never visits the valleys.

The soil in the valleys is generally a rich, inexhaustible loam, varying from 10 to 150 feet in depth, and yielding enormous returns for the labor expended upon it. On the Simi rancho a variety of soil is found, which, from results obtained, seems equally well adapted to deciduous fruits, grapes, and the smaller fruits and berries. Surface water is found there at varying depths from 14 to 28 feet, while artesian water is obtained at 70 to 90 feet. At Bardsdale is found a sandy loam productively strong, working easily, and suited to all the fruits the climate will permit. The fruits that have been fully tried and proved a success are lemons, oranges, prunes, apricots, plums, peaches, figs, walnuts, and raisins, with a tendency to make a specialty of lemons.

At Fillmore City the soil is an alluvium, deep, rich, the wash of the surrounding hills, and apparently well suited to the growth of citrus fruits.

A very large portion of the arable land of Ventura County is not irrigated, but should it ever be considered necessary there is within her borders ample water for irrigating the whole extent of her cultivable land. The numerous rivers and creeks which have their source in her mountain ranges, or find their way into her borders, give ample assurance of a never-failing supply of water for all purposes. Among the principal streams, the waters of which are or can be diverted for irrigating purposes, are the Santa Clara, Ventura, Santa Paula, Sespe, Piru, and the Las Posas Rivers, all having their source in the mountains from springs of pure, clear water; there are also a number of artesian wells in the county. The town of Ventura receives its supply of water from the Ventura River.

IRRIGATING WORKS IN VENTURA COUNTY.

Name.	Miles.	Assessed Value.
Santa Ana Water Co.	3	$11,610
Santa Paula Waterworks	2½	12,000
Sespe Land and Water Co.	3	3,000
Santa Clara Water Co.	10	1,400
Southside Improvement Co.	6	3,000
Totals	24½	$31,010

As has been seen, Ventura County, with its varied climatic and topographical features, its soil, and abundant water, presents opportunities for a wide range of horticultural pursuits, and, as might be expected, nearly all varieties of fruit are found growing in some portion of the county. While Ventura is behind many of her sister counties in her output of fruit, it has been owing to lack of transportation facilities and want of capital, rather than inaptitude for the business. Among other fruits we find there nuts and berries, apples, pears, peaches, plums, cherries, nectarines, almonds, loquats, grapes, strawberries, blackberries, etc., all of which thrive well, and it is peculiarly the home of the English walnut, apricot, and the prune. Some of the finest oranges and lemons which find their way to the markets are raised in the orchards of the Ojai Valley and adjacent lands; also in Santa Paula and Sespe districts.

Walnut growing is one of the specialties of Ventura County, and there the English walnut appears to reach its perfection. In speaking of the value of this crop N. B. Smith, one of the most successful horticulturists in the county, says that trees, when they become fifteen years old, and are well taken care of, are worth $500 each. In order to be worth this amount they must pay interest on a sum equivalent to that amount, and the occasion when this is yearly realized is not at all uncommon. A gentleman well informed upon the subject mentions a case of $60 worth of nuts being taken from a single tree in one season. Judge Poplin has several trees on his place for which he would not take $500 each. An article is worth what it will realize in the market, and a walnut orchard is certainly no exception to that rule. The fact that there is such a small area where they can be grown makes them exceedingly valuable to Ventura County, and the time will come when a 10-acre orchard will make the owner independent.

In the country around Fillmore, a subdivision of the Sespe ranch, citrus fruit does well, and its culture gives promise of becoming a prominent industry. The soil is a rich alluvium, deep and warm, the wash of ages from the hills around. It is particularly suited to the growth of the orange and the lemon. The fruit from the groves there, that are in bearing, is as bright and sweet and richly colored as the famous products of Riverside, while the olive, raisin grape, prune, and apricot grow thriftily, and bear profuse crops of fine fruit at an unusually early age.

There is a young orange grove there only two years old, the trees in which blossomed freely last year, and this season are laden with fine oranges. A resident on the avenue reports a like success with lemons. Another tells of a crop of figs gathered twelve months after setting the trees in the orchard. Still another of grapes on his vines one year from the cutting. On one ranch are tomato vines blossoming, and on the next strawberries ripening all the winter through. Innumerable similar evidences of the fertility of the soil and equability of the climate might be quoted if space permitted.

Los Posas is a promising fruit section, and Piru City has taken rapid strides in the same line. Large quantities of English walnuts, chestnuts, lemons, limes, olives, and oranges have been planted and all show a thrifty growth.

Saticoy is highly favored by having an abundant supply of good water, easily obtained, and a soil of great fertility. Some of the best fruit orchards of the Santa Clara Valley are to be found near by. A great many English walnuts also, of the soft-shell variety, have been planted in and around the town, and are making most remarkable growth, thus showing that this is the home of the walnut.

The hills north of Saticoy are particularly adapted to olives, as is demonstrated by the grove of Mr. Harold, near by, which cannot be surpassed for its age in the State. Prunes, apricots, and pears do well, and in fact nearly all kinds of fruits. Even the citrus varieties are doing well in the cañons.

In the Ojai Valley some excellent results have followed the planting of fruit trees, and excellent peaches, prunes, apricots, pears, grapes, and other fruits are produced there; while in the upper Oaji citrus fruits do well, and the olive seems to find its home there. The latter promises to become an important industry in time, as many hundreds of acres have already been planted to the olive in the Ojai Valley.

The chief fruit-producing sections of Ventura are, as mentioned above, Santa Clara Valley, Ojai Valley, and Las Posas. The principal fruits grown there are the walnut and apricot, and for these Ventura County seems especially suited. Following these are prunes, peaches, and citrus fruits. Small fruits do well, but are not grown to any great extent.

A very large area of new fruit trees has been planted in Ventura this year. A careful estimate places it at 30 per cent of the whole.

The crop of the present season is very good, Ventura County having suffered but little from the late season. Apricots were full and walnuts more than average, while other fruits made at least an average crop. Prices this season ruled high, apricots selling at $18 to $25 per ton. The principal markets for fruit from this county are San Francisco, Los Angeles, and the East, and the larger part of the output is marketed dried or canned.

At Santa Paula, N. W. Blanchard has one of the finest lemon orchards in the State, and this fruit does well there and returns large profits to the grower. There are also some extensive olive orchards, which do equally well with the lemon.

ACREAGE AND VARIETY OF FRUITS IN VENTURA COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	92	210	302	56
Apricot	825	232	1,057	92
Cherry	8	17	25	....
Fig	35	27	62	11
Olive	47	566	613	208
Peach	113	105	218	44
Nectarine	5	11	16	....
Prune	379	464	843	110
Pear	58	159	217	43
Lemon	237	206	443	67
Orange	220	328	548	104
Nuts—Almond	25	125	150	28
Walnut	997	5,308	6,305	900
Raisins	287	....	287	....
Table grapes	69	....	69	....
Totals	3,397	7,758	11,155	1,663

YOLO COUNTY.

Yolo County lies almost within the heart of the Sacramento Valley, on the west of the Sacramento River, which bounds its eastern border. On the north it is bounded by Colusa, on the west by Lake and Napa, and on the south by Solano County. It has an area of 1,018 square miles, or 650,000 acres.

The greater portion of its area is a level surface, but toward the west rise hills, which are interspersed with cañons and valleys of considerable extent. About 40,000 acres are tule lands, and but little waste land is found in the county. Cache Creek and Putah Creek are the two principal streams in the county. These rise in the mountains on the west and flow toward the Sacramento River. Cache Creek has its source in Clear Lake, in Lake County, and Putah Creek rises in the mountains of Napa County, and for part of its course forms the southern boundary of Yolo County. Although each of these streams is of considerable size when it first enters the county, they are both lost before reaching the Sacramento River. During the winter months both of these creeks are torrents, cutting their way, before reaching the Sacramento Valley, through precipitous cañons, carrying down bowlders, sand, and cobblestones to the valley below. These streams debouch into the valley at Capay and a few miles west of Winters, where the grade lessens. Putah Creek enters the valley from amid rolling hills, and the formations of shale, sandstone, and conglomerate in the neighborhood of Winters give place to clay and sand. At Capay, where Cache Creek enters the valley, its banks are composed of clay and gravelly strata; from there it flows through a flat country, sloping gradually to the southeast. A short distance east of Capay the creek widens, and its banks are only 4 or 5 feet high, while lower down, towards Madison Bridge, the stream is again confined between higher banks. The shifting waters of these streams have formed a bed of sand and gravel throughout the intervening country, which is now covered with soil. This gravel forms a water plane, which appears to slope to the southeast with a grade of about two and a half times that of the surface.

In climate Yolo varies little from other portions of the Sacramento Valley. During the summer months there is the usual hot weather, the mercury frequently reaching the 100° mark or over. Frosts sometimes occur in the early winter months, but are rarely severe, and the damage done by them is not usually great. In the Capay Valley the climate is mild, pleasant, and agreeable in winter, fall, and spring. The thermometer seldom falls below 40° above zero; occasionally there are a few mornings when it marks some degrees colder. There are hot waves, or spells, during the summer, when the thermometer reaches 100° and upwards for a few days at a time, but they are succeeded by milder days, and the nights are always cool and pleasant, with an almost entire absence of dews, so that these summer months are unsurpassed for fruit-drying, making it unnecessary to have expensive driers and evaporators. The air is pure, clear, and light, with but few foggy days. The climate is one of the best for pulmonary complaints; in fact, it would be difficult for one to die of consumption in that locality.

The following table gives the mean average temperature of each month of the year 1891 in various parts of Yolo County:

Place.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.
Davisville	74.4	74.1	70.6	69.0	55.5	49.0	43.4	50.7	53.1	65.1	66.8	69.9
Knights Ld'g.	73.7	72.8	67.5	65.7	56.8	46.3	41.3	50.5	51.0	60.3	66.3	67.2
Dunnigan	79.3	77.8	73.5	67.9	56.8	48.8	45.0	57.2	61.8	71.5	73.1	79.0
Woodland	82.8	78.6	77.1	78.1	68.1	51.9	43.2	46.1	48.1	51.7	62.5	67.3

Mean—Davisville, 61; Knights Landing, 60; Dunnigan, 66.4; Woodland, 63.5.

The monthly rainfall for nineteen years, from 1873 to 1891, inclusive, at Woodland, is given in the appended table:

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total for Year.
1873	1.25	2.84	.56	.18	none	none	none	none	none	.20	1.15	10.44	16.62
1874	5.99	1.33	2.85	.64	.40	none	none	none	none	3.26	2.79	.16	17.42
1875	5.22	.35	.66	none	.15	1.59	none	none	none	.44	3.87	2.49	14.77
1876	4.40	4.85	4.24	1.40	.45	none	.16	none	.17	3.37	.27	none	19.31
1877	3.95	1.42	.77	.03	.53	none	none	none	none	.94	1.10	1.29	10.03
1878	11.52	7.61	2.30	1.25	.60	none	none	none	.25	.34	.88	.01	24.84
1879	2.62	3.25	4.48	2.40	1.70	none	none	none	none	.22	7.15	3.66	20.48
1880	1.33	1.22	.97	6.84	.28	none	none	none	none	none	none	.73	19.37
1881	4.50	1.93	.97	1.39	none	.35	none	none	.50	.25	1.87	2.37	14.13
1882	1.24	1.87	2.34	1.51	.03	.07	none	none	.82	2.04	2.42	1.05	13.39
1883	.91	.60	3.24	1.22	4.65	none	none	none	.54	1.04	.30	.54	13.04
1884	3.67	4.07	6.53	4.03	none	3.02	none	none	.22	1.61	none	5.57	27.73
1885	1.62	.15	.15	1.50	none	none	none	none	.06	.05	9.14	2.73	15.40
1886	5.18	none	1.71	4.14	none	none	none	none	none	.59	none	1.39	13.64
1887	.88	7.56	.75	1.90	none	none	none	none	none	none	.60	3.67	15.36
1888	3.88	.97	2.80	.10	.77	none	none	none	.56	none	6.25	4.51	19.84
1889	.19	.49	5.09	.85	2.01	.43	none	none	none	5.54	3.54	8.16	27.10
1890	5.30	4.37	3.42	.95	1.68	none	none	none	.42	none	none	2.13	12.78
1891	.57	8.73	.62	1.53	.72	.12	none	none	none	none	.28	1.15	13.72
Sums	64.85	53.61	45.25	31.86	14.05	4.59	.16	none	3.54	19.89	36.61	60.05	324.60
Avgs	3.413	2.821	2.381	1.677	.739	.241	.084	none	.191	1.046	1.926	3.160	17.084

Season.	Total for Season.
1872-73	10.22
1873-74	23.00
1874-75	14.18
1875-76	22.30
1876-77	10.51
1877-78	26.69
1878-79	16.23
1879-80	16.50
1880-81	17.87
1881-82	12.25
1882-83	16.75
1883-84	22.75
1884-85	10.82
1885-86	23.64
1886-87	13.07
1887-88	12.79
1888-89	21.16
1889-90	30.98
1890-91	14.84
Sums	327.70
Average	17.247

It will be seen that the average rainfall is about 17¼ inches per year; rather above the general average for the State.

The soil of Yolo County is generally a rich, sandy loam, in many places 25 feet in depth. The surface soil throughout is principally a clayey loam, varying in places to sand or adobe, accordingly as the streams, which have influenced its quality, have borne an excess of either sandy or alluvial material from the neighboring mountains. Close to the western foothills the soil becomes frequently of a more gravelly nature, while upon the eastern side of the county, throughout the "tule" lands, which form the approach to the Sacramento River, the soil is more clayey, and usually gives place to "adobe."

Immediately along the western bank of the Sacramento there is a strip of land, averaging from half a mile to a mile in width, the superficial strata of which are formed of sedimentary deposits from the river. This land is remarkable for its fertility and facility of cultivation. There is also a large area in the eastern portion of the county, which is subject to overflow every two or three years by the Sacramento River, which leaves behind a deposit of very fertile soil.

In regard to Yolo's irrigation system, some time since Assistant State Engineer Schuyler made an official report, which embodied the following facts:

"Cache Creek is the outlet of Clear Lake, which receives the drainage of 420 square miles of the Coast Range, the total watershed of the creek being 1,024 square miles. The lake has a length of 23 miles, a maximum width of 8 miles, and a total area of about 51,000 acres. Its elevation above sea-level is 1,300 feet. It forms a catchment basin or a receiving basin, serving to lessen the volume of the floods of Cache Creek, which otherwise would pour down its steep slope with devastating force into the valley below.

"At flood stages, which are caused solely by winter rainfalls, the discharge of Cache Creek reaches a volume of 30,000 to 35,000 cubic feet per second. During the spring and summer the surplus waters of the lake gradually pass off, and the minimum discharge is found in October, when it is sometimes as low as 40 cubic feet per second. From Clear Lake, Cache Creek passes down a rocky cañon for 30 miles, with an average inclination of 28 to 30 feet per mile. Reaching Capay Valley it broadens, and its meanderings through that beautiful valley measure 28 miles, with a fall of 267 feet, or about 9½ feet per mile. In its farther course across Yolo County, until it loses itself in the tules of the Sacramento River, the creek has a fall of from 4 to 6 feet per mile.

"The first irrigation canal taken out of Cache Creek was constructed by James Moore, in 1856. It heads 8 miles above Woodland, and was originally 8 feet wide on the bottom and 6 to 8 feet deep. In 1863 it was enlarged to a bottom width of 16 feet, at which it still remains, although its depth has been considerably diminished. The capacity of the ditch has been estimated at 400 cubic feet per second; but in its present condition it will probably not carry one fourth of that amount. Its original cost was $10,000, but protracted litigation in defense of the water right has swelled the estimated total cost to $50,000. The area irrigated by the ditch is from 12,000 to 15,000 acres, most of which is devoted to alfalfa. The main branches and distributing ditches are owned by the irrigators by whom they were constructed. The main branch lines, of which there are five, are owned by incorporated companies, the stockholders in each being those using water from the ditch in which they are interested. These branches have a capacity of from 10 to 40 cubic feet per second. The dam by which water is converted into the canal is a temporary structure, made of brush and gravel. The first freshet in the fall sweeps it away, and when the water recedes the canal cannot get its supply until the dam is renewed, which does not occur until the low water in the summer. In 1877 the dam was completed April 16th; in 1878, August 1st, and in 1879, July 25th. All the earlier part of the season, therefore, before the completion of the dam, the irrigators are obliged to do without water at a time it is most needed. The revenues of the canal were considerably over $5,000 in 1878, and over $7,000 in 1877, and as the expenses are light, consisting only of the yearly renewal of the dam, and the salary of a zanjero during the irrigating season, the property is a valuable one. The yearly cost of renewing the dam is from $500 to $2,500, the greater cost occurring when the work is done in the spring months before the water has subsided. With a permanent dam, and the assurance of a constant supply of water when needed, the area irrigated would be much greater, as alfalfa is found to be a very profitable crop, and water is in general demand. So great is the demand, in fact, that the irrigators, it is reported, frequently volunteer to replace the dam in the spring when they most require water, at their own expense; but the owner prefers to manage it in his own way and takes his own time."

IRRIGATING WORKS IN YOLO COUNTY.

Name.	Miles.	Value.
Moore's irrigating ditches	50	$20,000
Clear Lake irrigating ditches	10	1,000
Capay irrigating ditches	10	1,000
Adams irrigating ditches	20	2,000
Totals	90	$24,000

Yolo holds an enviable position among the horticultural counties of the State, for while she has as yet no great extent of land devoted to any one fruit, sufficient has been done to prove that in soil, climate, and topographical conditions she is adapted to the production of a large range of varieties, and will in time take rank as one of the leading horticultural counties of Central California. The output of fruit grows larger every year, and the area devoted to orchards and vineyards receives constant accessions. Enormous quantities of fruit are shipped annually through the Buckeye Grangers Warehouse Association; over 3,000,000 pounds, or 141 carloads, of various deciduous fruits were shipped through that association in the year 1891.

The apricot thrives well there, especially in the sandy soil, and reaches perfection along the river banks and in the valleys of the Coast Range. The peach is a standard fruit, and it reaches a perfection attained in few other localities, the fruit being large, luscious, and finely flavored. Prunes are extensively planted and do well. The pear, especially the Bartlett, is very widely grown and generally does well. Figs grow luxuriantly, bear in every part of the valleys and foothills, and thrive with the least possible attention. Several thousand acres of land are planted to vines of different varieties, raisin, wine, and table grapes being produced in large quantities. Yolo was the pioneer of the raisin industry in California. Her most extensive raisin vineyards are located near Woodland, but the first experiments were made near Winters in 1869, on 240 acres. Other fields were planted until the owner, R. B. Blowers, now has 1,200 acres in vines. In the Capay Valley very extensive planting has been done in the past year or two, especially by the Western Coöperative Colonization and Improvement Company.

The fruits set out are mostly of the standard varieties—peaches, apricots, Bartlett pears, prunes, figs, raisin grapes, etc., while along both sides of the avenues throughout the tract walnuts will throw their grateful shade. A considerable number of citrus trees are also being set out, quite sufficient in number to demonstrate that these fruits can be successfully grown in the valley, about which the colonists appear to have no doubt, provided proper care is given to the young trees. Up to March 24, 1892, the company has sold about 3,000 acres of land. Of this amount more than 1,700 acres have been planted to trees. On the 1st of January, by actual ascertainment, 136,000 trees had been planted. This does not include many thousands of trees planted on land purchased from private individuals. On land sold by the company, it is expected that 400 acres of orchard will come into bearing this season.

The sections of Yolo County which are chiefly devoted to fruit are Putah Creek, and the country aligning the Sacramento River from Davisville to the northern part of the county, and the favorite fruits are grapes, apricots, prunes, almonds, figs, pears, apples, cherries, and the small fruits in order. The markets for Yolo's products are found in Sacramento, and in the Sacramento and Marysville canneries, San Francisco, and the East. A great deal of the fruit is shipped in its green condition to the East. Green fruit is packed in boxes of 20 to 40 pounds each, the pears being packed singly, and wrapped, in 40-pound boxes. Almonds are shipped in sacks of 40 pounds each, raisins in sacks and boxes, dried fruit in sacks, and that which is shipped to the canneries is packed in open boxes. The output for the season of 1891 in Davisville and vicinity was:

Raisins	250,000 pounds.
Almonds	20 tons.
Table grapes	15,000 crates.
Dried fruit	2,000 sacks.
Pears	30,000 boxes.
Plums and peaches	5,000 boxes.

Prices for 1891 ruled low, as they did elsewhere. This year there has been a very material advance, as will be seen by the following comparative table:

	1891.	1892.
Pears	1½ to 1¾ cts.	2 to 3 cts.
Peaches	1½ cts.	1½ to 2 cts.
Plums	1 ct.	....
Prunes	1 ct.	1¼ cts.
Apricots	1¼ cts.	2 cts.
Almonds	10 to 12½ cts.	12 cts.
Raisin grapes	$22.50 per ton	....

The yield of fruit from Yolo County has been reported as follows: Peaches will average one half crop, apricots one half crop, grapes two thirds crop, while pears, plums, prunes, and almonds are reported as average.

A very considerable area of new land has been set to fruit in this county during the present season, comprising about 25 per cent of the whole.

ACREAGE AND VARIETY OF FRUITS IN YOLO COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	20	5	25	1
Apricot	450	374	824	71
Cherry	18	7	25	2
Fig	58	10	68	4
Olive	12	11	23	4
Peach	620	420	1,040	107
Prune	730	792	1,522	161
Pear	410	211	621	53
Plum	5	10	15	3
Orange		5	5	
Nuts—Almond	160	339	499	121
Raisins	5,500		5,500	
Table grapes	1,500		1,500	
Totals	9,483	2,184	11,667	527

YUBA COUNTY.

Yuba County derives its name from the Yuba River, which flows along its southern border, and is bounded on the north by Butte County, south by Placer, east by Nevada and Sierra, and west by Sutter County. Its average length in a northeasterly direction is 60 miles, and in breadth varying from 7 to 30 miles, giving it a superficial area of 617 square miles, or 440,000 acres. Yuba County very much resembles Sutter County. They are neighboring counties, and the physical characteristics of the one, with a single great exception, have their counterpart in the other. The exception is that while Sutter is entirely in the plains, Yuba runs up into the Sierra, a fact which alters completely Yuba's place in the economy of the State.

Yuba County occupies a position in the heart of the Sacramento Valley. That part embraced in the angles formed by the junction of the Yuba and Bear with the Feather River, is level and well supplied with small streams. The foothill region, which reaches from the valley eastward, is at first rolling, but becomes hilly, brushy, and rocky as the Sierra Nevada Mountains are approached. The northeastern portion is rugged and broken. The land is divided about as follows, between valley, foothill, and mountain: The area of the county is 440,000 acres—valley land, 105,000 acres; foothill land, 136,000 acres; mountain, 199,000.

In the valley the wet and dry seasons are very distinctly marked, the fog seldom appearing. The temperature during the day is usually high, but is cooled by the strong winds which constantly blow through the valley from the ocean on the south, and from the north by the cool air oozing down from the snow on the summit of the mountains of Siskiyou and Shasta. In summer there are a few warm days, but the evenings and mornings are invariably cool. The seasons also touch extremes which the coast belts never experience, the winter being 4° colder and the summer from 16° to 20° warmer. The thermometer during summer ranges from 76° to 90°, and in some instances reaches as high as 100° or over; but so dry is the heat that a long and hard day's work may be done in the open air without the laborer feeling any inconvenience or exhaustion.

The valley lands of the county are deep and rich, and of an alluvial character, entirely free from rock and stones. The valley and foothill lands are, in general, well adapted to fruit growing, and of late years there has been a steady advance of the horticultural industries there, especially along the Feather River.

The lands in the valley, or western half of Yuba, are mostly used for the growing of grain, though most of the farmers owning large tracts have small orchards. On the east bank of the Feather River in Yuba County, where there is much rich bottom land, there are now several large orchards and vineyards which are as fine as any to be found in California. In this vicinity alone over 1,000 acres have been planted to fruit the past spring. The soil of the county is divided into three general classes—foothills, plains, and river bottom. The foothill land is peculiarly adapted to growing fruits. Up to a short time ago the foothill lands of this county were regarded by the settlers as almost valueless, but the success of fruit growing on that class of land in adjoining counties, and the adaptability of the produce for long shipment, gave immediate value to them, and to-day lands are held at $100 per acre, and upwards, which twenty years ago would not have brought more than $1. The lands on the plains are devoted principally to cereals, and there has been no failure of crop with them during the past twenty years. On this land the vine and fruit trees flourish without irrigation; however, the land could easily be irrigated, and soon will be, by means of ditches, a number of which are now in course of construction. The river lands are the best and most productive, fruit, grain, and vegetables being raised in abundance, and the income per acre is far above the general average. There is very little land in the county that cannot be cultivated to great advantage, either in grain or fruit.

There is a lavish water supply in Yuba County. There are three rivers—the Feather, Yuba, and Bear—bordering and passing through this county; each of these has numerous tributaries. Yuba was in early days one of the principal mining counties of California, and there is now a perfect network of old mining ditches which can be used for irrigating purposes. These ditches, with their tributaries, aggregate hundreds of miles. Their owners have extended many of these from the foothills to the plains below, and it is believed that these old mining ditches have sufficient capacity to carry water enough to irrigate all the arable land of Yuba County.

Among the most important irrigation enterprise in the county has been the organization of the Browns Valley Irrigation District, under the Wright Act. This district was organized in October, 1888, and comprises 44,000 acres of the choicest foothill land of California, consisting of sunny slopes and fertile valleys, upon which grow, with tropical luxuriance, every variety of citrus and deciduous fruits, berries of every kind, alfalfa, grasses, and vegetables, wherever the life-giving water is applied.

This district lies between the Yuba River, which forms the southern boundary, and the Honcut Creek, which forms its northern boundary, the western boundary skirting along the foothills 11 miles east of the city of Marysville. The land has been heretofore chiefly used for stock raising and the production of hay and grain, owing to a lack of water; but the few spots in the district where water could be had in the past show the nature and productiveness of the soil and climate to great advantage. The bonded indebtedness of the district is $110,000, or $2 50 per acre. The water supply is more than bountiful, as at the lowest stage of the North Yuba River at least 25,000 miner's inches run by after the headgates of the district are full.

The district has been actively at work pushing its elaborate system of irrigation works. In 1890 the district purchased 22 miles of distributing ditches from the South Feather Water and Union Mining Company, and built 18 miles of main canal, consisting of excavating and rock-wall work, and 1 mile of fluming, besides a suspension bridge 110 feet high across a gorge in Dry Creek, over which a large pipe extending 1,600 feet was also constructed, carrying the water up on to the grade with the main distributing canal, and constructed a heavy headdam 25 feet high and 140 feet long, with a 40-foot base, across the North Yuba River. The dam was constructed of peeled logs, notched and drift-bolted into each other, and all securely bolted, with bolts soldered deep into the solid rock sides and bottom of the river at every available point, with all cribs filled in with heavy rock blasted from the mountain. The dam is to have elaborately constructed gates to let the water into the flumes, which are 7 feet above the high-water mark.

There are few places in Yuba County where fruit may not be profitably raised. Every kind of fruit does well there; all the small fruits are very productive and well repay the labor bestowed upon them. In the valleys and foothills grapevines flourish to perfection. Citrus fruits do well in some parts of the county, and the olive does well in most parts. Fig trees of a mammoth size grow there. In commenting upon the advance made by Yuba County in horticulture, the Marysville "Democrat" says:

"Thirty years ago few orange trees had been planted in this vicinity, and they were put in the ground as experiments and for shade trees. Each year demonstrated that this was the home of the orange as well as the fig and other tropical fruits, and when the trees began to bear, and the beautiful golden fruit ripened, the sight was so pleasing that many citizens who had not yet put in any commenced to plant the orange tree, and in ten years they were to be found in more than one hundred different places in this city. Gradually, year after year, the planting continued, and not only the orange, but the lemon, lime, pomelo, loquat, persimmon, olive, and many others, until 1887, when an inventory was taken at the request of the Citrus Committee, by E. E. Meek, who went from place to place and made an actual count of all varieties and kinds then growing, and with the following result: He ascertained that there were then 186 residences where bearing orange trees were growing, ranging in number from 4 to 100 each, in all 1,881 trees. There were also 76 of them who had bearing lemon trees, in all 219. Seven who had limes, 6 who had citron, 28 who had pomegranates, 32 who had persimmons, 8 who had olives, and 34 who had loquat trees, making a total of bearing trees of all kinds named of 2,818. There were also of young trees not yet bearing fruit, 36,820 oranges, 4,634 lemons, 420 limes, 68 citron, 361 persimmons, 216 olives, and 186 loquat trees, making a total of growing trees of these varieties of 45,423. There were also large numbers of almonds, English walnuts, chestnut, and other nut-bearing trees.

"In a further investigation by the committee, extending outside of the city, they found over 300 bearing orange trees, and about 9,000 bearing almond trees. From these trees the committee had gathered and sent to the citrus fair, held in Sacramento that winter, over 5,000 pounds of fruit, and this county was awarded premiums, including Mrs. M. Karr, who received a magnificent premium offered by the Southern Pacific Railroad Company for the best individual exhibit. The fruit that came from the foothills at Browns Valley, Smartsville, and other places, was of the finest quality and free from scale or disease, and was conceded to be colored better, and in general more perfect than much of that grown in the valley. Since that time the business of orange growing has advanced rapidly, and now there is to be found quantities of that beautiful fruit for sale by many of the growers in this city and vicinity, and at the close of the late citrus fair a carload or more was sent to an Eastern market. Smartsville had nearly enough to fill a car. A few years ago the whole business was one of pleasure and not profit, but now it is a remunerative, and at the same time a pleasant occupation.

"The stoppage of hydraulic mining has induced many to turn their attention to fruit growing, particularly in the way of orange culture, and the groves at Smartsville, Colmena, and Marysville are indicative of the fact that Yuba County can successfully compete with her southern sisters."

While the many old and vigorous orange trees in the Marysville district are the best of evidence of the existence of favorable conditions for the culture of citrus fruits, the planting of orange orchards, as a business, began but a few years ago. The attention of the people had previously been devoted almost exclusively to the production of grain and deciduous fruits. But with the opening of the first citrus fair at Sacramento in January, 1886, popular interest in orange growing was awakened in Northern California, and this interest has since increased from year to year. Within the past three years several thousand acres north of Sacramento have been planted with orange trees, and the orange planting during the present season bids fair to be very extensive. One of the largest orange orchards in the State, covering 100 acres of ground, was set out two years ago at Colmena, in the open valley of the Sacramento, 6 miles south of Marysville, and the trees have made an excellent growth since that time, with no injury from frost.

The Marysville cannery, located on the corner of E and Tenth Streets, is one of the flourishing institutions of Marysville. During the season the cannery employs some 450 hands, and pays out annually an average of $50,000 for wages. The plant, although the buildings are not of an imposing style of architecture, now covers, including the drying houses and tracks, about 5 acres of ground.

The Marysville cannery was established in 1888 by Mr. R. W. Skinner, a man possessed of considerable skill and wide experience in the handling of choice fruits and in the management of extensive business affairs. The high standard adopted by Mr. Skinner in the selection and preparation of the apricots, plums, peaches, and Bartlett pears, which are the popular brands, and of the various other kinds of fruits, vegetables, and berries grown in Northern California, has won for the Marysville cannery the highest praise throughout the United States.

In order to emphasize the importance of Marysville to the industry built up by Mr. Skinner and associates, the appended statistics will be of value:

During the season of 1891 about 350 cars of all kinds of fruits were received and unloaded at the Marysville cannery. This, together with that brought by team, was packed into a million quart cans, weighing about 2,000 tons. To fill the interstices in this million cans 150,000 gallons of syrup were used, to make which about 9 carloads of sugar were bought. It took 12 tons of solder and 2,000 gallons of gasoline to seal the cans.

From these general statistics one can form an idea of the enormous amount of labor required to pack, cook, test, pile, and label the product of the Marysville cannery. In the warehouse one walks through lanes and tunnels which open through the large piles, towering to the roof, of cases and cans awaiting shipment. The business of the cannery is constantly increasing, and the season of 1891 will show a quarter larger pack than 1890.

As the young orchards come into bearing the capacity of the cannery is enlarged, to keep pace with the progress of fruit culture. In the yards, where drying is done, 90 tons of apricots and 150 tons of peaches were prepared for market.

One of the products of the Marysville cannery, which other similar concerns have not produced as yet, is vinegar. In the dry yards a series of vats and presses are arranged. Here all the fruit peelings of the cannery are brought and pressed by immense screw presses, the juice being conveyed into barrels, where it is allowed to ferment and form a superior quality of vinegar. The product of the vinegar vats for the season of 1891 will be about 1,000 barrels. The peelings, after being pressed, are left in the form of a big, round cake, which are sold to the orchardists for fertilizing purposes. The pits of the various fruits, peaches especially, are carefully saved and sold to nurserymen for propagating nursery stocks.

Thus the system of the Marysville cannery is complete in every particular, and their market is the world; orders for its products coming from points as far distant as London and South America.

The chief fruit sections of Yuba County are Colmena, on the Feather River, and in the vicinity of Marysville, and the fruits chiefly produced there are peaches, pears, apricots, prunes, cherries, plums, and oranges. The markets for these are found in the East, in the Marysville cannery, and in San Francisco. The fruits shipped to the East are boxed and shipped green. There is a very large output of dried and canned fruit from this county. The output of the different kinds of fruit for the past two seasons is given below:

	1891—lbs.	1892—lbs.
Apples	459,700	472,000
Apricots	360,000	290,000
Cherries	152,000	175,000
Figs	76,500	72,000
Olives	2,500	2,000
Peaches	525,900	610,700
Pears	629,900	692,300
Prunes	300,600	210,000
Oranges	102,900	130,000
Nuts—Almonds	12,000	13,000
Walnuts	10,500	8,600
Raisin grapes	916,800	1,100,200
Table grapes	810,300	880,200
Totals	4,359,600	4,656,100

SCHEDULE SHOWING ACREAGE AND VARIETIES OF FRUIT GROWING IN CALIFORNIA IN 1892.

Name of County.	Apple.		Apricot.		Cherry.		Fig.		Olive.		Peach.		Nectarine.		Prune.		Pear.		Plum.		Quince.		Lemon.		Orange.
	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.
Alameda	435	70	2,630	680	1,743	428	21	3	32	5	963	412	176	231	1,860	491	1,384	317	1,604	221	3	1	1		7
Alpine	8	7½		½	½	½					½	½			1½	2	1	1½	1						
Amador	112	15	50	65	10	8	20	14	1	7	120	223	8	18	30	184	41	30	10	23					
Butte	204	103	310	230	80	85	60	199	55	700	1,180	2,106			300	731	200	713	51	170			5	15	500
Calaveras	172	18	20	33	12	7	18	8	15	105	146	194			8	61	85	25	30	20	1				1
Colusa	6	3	156	124	8	11	21	5	2	8	43	186			167	637	100	179					½	1	1
Contra Costa	78	36	235	152	133	73	24	15		160	214	213			338	316	304	295			41	37	2	1	4
Del Norte	96	27	½	½							4	3			2		5	2	4	4					
El Dorado	248	7	16	13	29	10	14	10	3	13	1,153	185			202	77	36	160	32	9			1	3	4
Fresno	38	147	448	112	4	3	320	131	70	50	1,214	844	81	68	640	938	422	212	12	13			1	2	9
Glenn	32	77	117	110	7	16	13	16	4	5	200	186			50	200	60	63	7	3					12
Humboldt	600	149	5		22		2		9		15		1		275	176	8		9		1				
Inyo	85	62	11	13	8	6					82	28			47	25	12	26							
Kern	226	112	79	221	10	15	56	25	1	30	662	417			399	547	65	250					1	2	8
Lake	158	70	10	12	9	35	12	13	1	53	140	70			160	278	54	99							
Lassen	300	37	30	23							10	15				2	58	10	14	7					
Los Angeles	882	629	1,774	1,125	18		549	424	415	373	2,191	1,868	30	6	1,724	1,701	778	883	147	160	16		556	1,217	7,387
Marin	470	16	50	21	12	3		3		1	50	40			12	34	40	20							
Mariposa	115	50	15	3	10	5	14	5	15	15	12	8		4	10	15	20	8		2				10	20
Mendocino	536	60		3	10	7		1	2		47	50	15	25	121	447	80	30							
Merced	30	4	23	12	2	2	39	130	3	297	164	259			13	135	31	56					1	4	6
Modoc	210		6		3						14				10		25		10		2				
Mono	11																								
Monterey	249	101	425	158	18	10	7	10	42	10	150	26			566	520	85	16	21	9					
Napa	215	46	70	128	140	120	10	13	43	62	527	318			311	816	200	86					1	3	5
Nevada	300	60	15	26	10	16	4	10	2	11	226	100			45	20	249	410	4	5					½
Orange	86	42	1,112	380			33	49	39	31	1,016	187	30		1,657	131	670	133	5				251	230	5,286
Placer	202	130	94	186	197	75	55	37	64	355	1,951	1,670	10	3	127	102	499	570	211	165				5	53
Plumas	50	10			2					3							16		4						
Sacramento	29	10	436	99	123	37	38	96	87	30	1,970	900			680	403	1,942	650	650	37			3	8	125
San Benito	87	23	181	47	28	12	28	9	21	17	124	83			427	275	104	58	9	7			1		1
San Bernardino	107	115	1,113	441			102	260	127	185	1,948	142			351	1,112	345	57					436	567	26,585
San Diego	705	45	776	185	10	6	154	137	735	328	608	185	11		536	140	537	54	201	13	6		3,509	1,266	626
San Joaquin	35	40	323	370	46	65	42	113	1	83	324	506			366	145	124	256						1	1
San Luis Obispo	219	151	232	134	91	21	24	10	84	44	306	203			828	316	141	214					104	36	15
San Mateo	140	9	45		5		1			28	12		1		16	32	26								
Santa Barbara	289	128	762	159	108	92	450	300	565	306	549	112	11	21	659	168	200	108			20		476	800	224
Santa Clara	500	250	2,900	1,450	850	400	12	8	90	45	3,458	2,112			5,000	3,000	600	300	575	325	40		3	2	25
Santa Cruz	719	900	310	370	159	181			4	120	351	421			917	1,065	194	139							
Shasta	97		81	200	12	14	8		20	17	526	300	7	3	280	400	73	10	2	3	1				6
Sierra	68		2		4						5						4		2						
Siskiyou	739	473	23	97	12	10					43	70	6	2	12	18	13		2	1	7	2			
Solano	47	6	2,533	1,200	320	116	76	175	50	54	3,395	1,520	103	57	1,200	1,670	2,050	1,000						8	15
Sonoma	3,100	1,021	129	100	150	167	30	21	156	451	1,707	800			1,018	1,581	984	423					1	1	
Stanislaus	101	81	122	77	18	14	57	86		22	180	160		7	5	43	94	84						4	15
Sutter	40	36	164	63	37	4	14	70	13	4	597	384			148	79	170	222					1	1	3
Tehama	38	48	243	331	25	34	33	92	10	97	2,102	1,080			600	728	221	296			12			2	2
Trinity	22	20	2		2						25	10					20	30	3						
Tulare	104	43	350	374	1	5	50	132	30	290	2,160	1,640	56	72	1,971	3,150	350	292	37	52			12	51	50
Tuolumne	200	68	20	7	25	3	12	6		2	90	7		1	3	1	58	10	3	2		2		2	1
Ventura	92	210	825	232	8	17	35	27	47	566	113	105	5	11	379	464	58	159					237	206	220
Yolo	20	5	450	374	18	7	58	10	12	11	620	420			730	792	410	211	5	10					
Yuba	97	6	108	53	14	25	37	5	13	120	84	267			127	130	122	207	20	8			9	2	31
Totals	13,751	5,776½	19,831½	10,194	4,563½	2,165½	2,553	2,678	2,883	5,114	33,791½	21,035½	551	529	25,328½	24,298	14,368	9,374½	3,745	1,209	150	42	5,612½	4,450	41,248½

ARIETIES OF FRUIT GROWING IN CALIFORNIA IN 1892.

Pear.		Plum.		Quince.		Lemon.		Orange.		Almond.		Walnut.		Raisins.	Table Grapes.	Small Fruits.	Total Bearing.	Total Non-Bearing.	Grand Total.	Plant of 1892.
Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.	Bearing.	Not Bearing.							
1,384	317	1,604	221	3	1	1	---	7	5	1,012	225	28	8	---	---	1,343	13,302	3,097	16,399	1,273
1	1½	1	---	---	---	---	---	---	---	---	---	---	---	---	1	2½	16	12½	28½	4½
41	30	10	23	---	---	---	---	---	2	12	32	3	6	3	5	20	445	627	1,072	512
200	713	51	170	---	---	5	15	500	2,164	560	1,028	5	7	394	293	18	4,215	8,251	12,466	2,738
85	25	30	20	1	---	---	---	1	14	30	59	12	11	23	154	64	791	555	1,346	232
100	179	---	---	---	---	½	1	1	8	30	16	20	40	216	160	---	930½	1,218	2,148½	122
304	295	---	---	41	37	2	1	4	3	253	224	---	50	216	425	68	2,335	1,575	3,910	741
5	2	4	4	---	---	---	---	---	---	---	---	---	---	---	---	---	113½	36½	150	14
36	160	32	9	---	---	1	3	4	2	13	8	3	5	79	190	---	2,023	502	2,525	151
422	212	12	13	---	---	1	2	9	124	5	21	10	60	43,900	---	---	47,174	2,725	49,899	6,572
60	63	7	3	---	---	---	---	12	11	70	118	30	50	900	50	---	1,552	855	2,407	493
8	---	9	---	1	---	---	---	---	---	---	---	3	---	---	3	94	1,047	325	1,372	146
12	26	---	---	---	---	---	---	---	---	---	2	1	3	60	20	---	326	165	491	49
65	250	---	---	---	---	1	2	8	18	39	128	30	41	5,600	210	---	7,386	1,806	9,192	538
54	99	---	---	---	---	---	---	---	1	9	16	15	60	4	450	---	1,022	707	1,729	185
58	10	14	7	---	---	---	---	---	---	---	1	---	2	---	---	74	486	97	583	33
778	883	147	160	16	---	556	1,217	7,387	4,910	57	50	1,752	37	671	1,182	321	20,450	13,383	33,833	8,223
40	20	---	---	---	---	---	---	---	2	2	---	---	1	---	---	---	636	141	777	50
20	8	---	2	---	---	---	10	20	8	14	8	8	4	40	120	2	415	145	560	54
80	30	---	---	---	---	---	---	---	1	3	2	---	---	7	14	13	848	626	1,474	175
31	56	---	---	---	---	1	4	6	46	8	57	7	7	1,160	465	---	1,952	1,009	2,961	326
25	---	10	---	2	---	---	---	---	---	---	---	---	---	---	---	---	280	---	280	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11	---	11	---
85	16	21	9	---	---	---	---	---	---	10	10	7	16	---	---	---	1,580	886	2,466	297
200	86	---	---	---	---	1	3	5	11	27	50	12	28	---	6	12	1,579	1,681	3,260	517
249	410	4	5	---	---	---	---	½	1½	14	13	13	6	14	105	4	1,005½	678½	1,684	182
670	133	5	---	---	---	251	230	5,286	126	2	---	1,467	1,125	422	130	---	12,206	2,434	14,640	2,558
499	570	211	165	---	---	---	5	53	220	26	43	7	15	128	1,174	28	4,826	3,576	8,402	856
16	---	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	72	13	85	---
1,942	650	650	37	---	---	3	8	125	70	126	132	26	18	400	2,550	870	10,055	2,490	12,545	700
104	58	9	7	---	---	1	---	1	2	56	20	35	9	17	12	20	1,151	562	1,713	128
345	57	---	---	---	---	436	567	26,585	9,652	57	---	131	70	4,970	274	89	36,635	12,601	49,236	4,424
537	54	201	13	6	---	3,509	1,266	626	404	28	46	389	178	3,454	510	---	12,795	2,987	15,782	1,533
124	256	---	---	---	---	---	1	1	37	97	755	27	42	618	1,043	520	3,567	2,413	5,980	591
141	214	---	---	---	---	104	36	15	5	23	16	245	234	---	925	25	3,262	1,384	4,646	667
26	---	---	---	---	---	---	---	---	---	5	---	---	---	10	100	---	361	69	430	39
200	108	---	---	20	---	476	800	224	116	240	100	1,117	786	---	573	---	6,243	3,196	9,439	1,548
600	300	575	325	40	---	3	2	25	15	130	70	10	7	200	1,200	360	15,953	7,984	23,937	1,309
194	139	---	---	---	---	---	---	---	---	---	---	3	10	---	1,253	260	4,170	3,206	7,376	955
73	10	2	3	1	---	---	---	6	20	31	50	---	---	---	---	---	1,144	1,017	2,161	301
4	---	2	---	---	---	---	---	---	---	1	---	2	---	---	---	5	93	---	93	---
13	---	2	1	7	2	---	---	---	---	2	3	1	1	---	10	25	895	677	1,572	175
2,050	1,000	---	---	---	---	---	8	15	55	930	540	13	57	1,328	382	---	12,442	6,458	18,900	1,881
984	423	---	---	---	---	1	1	---	---	37	33	38	42	---	427	200	7,977	4,640	12,617	1,426
94	84	---	---	---	---	---	4	15	97	11	25	---	3	---	---	---	603	703	1,306	271
170	222	---	---	---	---	1	1	3	24	159	145	13	2	418	34	---	1,811	1,034	2,845	311
221	296	---	---	12	---	---	2	2	13	55	311	4	26	607	310	40	4,302	3,058	7,360	915
20	30	3	---	---	---	---	---	---	---	1	---	20	---	---	60	30	185	60	245	9
350	292	37	52	---	---	12	51	50	54	3	4	4	8	10,264	---	---	15,442	6,167	21,609	2,326
58	10	3	2	---	2	---	2	1	4	3	5	7	6	50	25	22	519	126	645	31
58	159	---	---	---	---	237	206	220	328	25	125	997	5,308	287	69	---	3,397	7,758	11,155	1,663
410	211	5	10	---	---	---	---	---	5	160	339	---	---	5,500	1,500	---	9,483	2,184	11,667	527
122	207	20	8	---	---	9	2	31	180	10	12	5	3	262	38	10	987	1,018	2,005	284
14,368	9,374½	3,745	1,269	150	42	5,612½	4,450	41,248½	18,758½	4,386	4,842	6,520	8,392	82,222	16,452	4,539½	282,496½	118,918½	401,415	49,055½

Prices received in Yuba last season and this ranged as follows:

	1891.	1892.
Apples	¾ to 2c.	1 to 2½c.
Apricots	1¼ to 1½c.	1½ to 2½c.
Cherries	4½ to 10c.	4 to 10c.
Figs	3 to 4c.	3 to 4c.
Peaches	1½ to 2½c.	2½c.
Prunes	1¼c.	2½ to 2¾c.
Nuts—Almonds	10c.	12c.
Walnuts	8c.	8 to 9c.
Raisin grapes	1¼c.	1¼c.
Table grapes	2 to 3c.	2 to 3½c.

ACREAGE AND VARIETY OF FRUITS IN YUBA COUNTY.

Variety.	Acres in Trees.			
	Bearing.	Non-Bearing.	Total.	Plant of 1892.
Apple	97	6	103	2
Apricot	108	53	161	20
Cherry	14	25	39	10
Fig	37	5	42	3
Olive	13	120	133	35
Peach	84	267	351	58
Prune	127	130	257	33
Pear	122	207	329	80
Plum	20	8	28	2
Lemon	9	2	11	1
Orange	31	180	211	35
Nuts—Almond	10	12	22	4
Walnut	5	3	8	1
Raisins	262	--------	262	--------
Table grapes	38	--------	38	--------
Small fruits	10	--------	10	--------
Totals	987	1,018	2,005	284

CHAPTER IX.

REVIEW OF THE FRUIT SEASON.

The fruit season now drawing to a close has been an especially good one for the growers of California. While there has been a shortage in many varieties, especially in prunes and peaches, in many parts of the State, the largely increased demand over last season, with its necessary increase in price, has very much more than compensated our fruit growers for their shortage, and the amount of money brought into our State by this industry will largely exceed that of any preceding year. Reports reached us early in the season to the effect that over a large part of the Eastern States a heavy shortage was probable in all lines of fruit, amounting in some parts to a total failure. This would necessarily cause an increased demand for the California article. The result was that prices which started low early in the season steadily advanced until very high figures were reached.

The disordered condition of the market in 1891 led to the very cautious purchase of dried fruit by the jobbers, and a large surplus was supposed to be on hand. This, however, had been exhausted before any returns from the present season were made.

The State Board of Trade made an effort to open a market for the supposed surplus, and made a shipment of dried fruit to England. The shipment was made simply as an experiment, and went forward in the usual manner, and was sold through the ordinary channels of trade. After paying freights, duties, storage, drayage, and other incidental charges, it was found that the peaches and nectarines netted 9 cents a pound, and the apricots 7¼ cents.

"We then concluded," said Mr. Gregory, "to make up a full car, but to our astonishment, after canvassing the State, we found that we could not get enough dried fruit together to make up the shipment. I consider this a most favorable condition of the fruit business. Early in the season it was generally believed that our market was glutted with dried fruit, and that we had overproduced ourselves in this regard. Now this supposed surplus was all sold, and a couple of months left between us and the season's pack.

"These facts show that the market is constantly opening into districts throughout the United States hitherto closed to us. We have also demonstrated that England, with her millions of consumers, is ready to take our fruit, even at advanced prices.

"The prospect for the fruit grower never looked better than at the present, and there is no danger of those who invested in the enterprise failing to realize handsomely if they attend to business and produce a marketable article."

Fruit crops in the Eastern States, which gave good promise early in the season, were greatly damaged by cold, wet weather, and the season was unusually late. In Illinois, Indiana, and Ohio the crop was very poor. In Michigan less than one third of a crop was reported. In Kentucky the report was fair to poor. In Missouri, Kansas, and Nebraska the yield was very light and the fruit very poor. In portions of Iowa the crop was fair, but in the greater part of the State it is reported as very poor. In Wisconsin and the Dakotas the yield was average, and in Minnesota fair. In some of the Southern States there was a fair peach crop, but in the large peach districts of Delaware and Maryland the crop was very short. This is caused, largely, by the yellows and rosette, with which this district, in common with many other peach sections of the East, is afflicted. In relation to these diseases, and their effects, J. J. Pratt, of Yuba City, who visited the peach districts of the East during the fruiting season, said: "In a year or two longer the fruit growing of the East will be a dead letter. The disease known as the yellows is something terrible; it is far worse than the combined enemies of the California orchardist. Where the yellows is prevalent the fruit tree is doomed. Trees in those districts will not live over two years, and the disease cannot be eradicated from the soil."

The cautious purchase of last season's crop, the exhaustion of the stock of dried fruit in the market, the shortage of the Eastern crop, caused by an inclement and unfavorable season, and the spread of orchard diseases, all combined to make a demand for California fruit, and to advance its price early in the season.

The probable advance in the value of fruit was early appreciated by the canners and packers, who endeavored to make season contracts at low rates, and were in some cases successful, but in a majority of cases the grower got the full market value of his crop.

The season of 1892 opened with great promise to the orchardist, and the prospects were good for an extraordinary yield. A change, however, came, and in the place of a warm, early season, April came with bright, cool days and frosty nights. Late rains, coming when the trees were in bloom, had washed away the pollen and prevented the setting of a large part of the crop, and this, followed by the cold weather, seemed for a short time to threaten the entire crop; but the result proved that while the crop was much below the average in most lines, the fruit as a whole was better, and the increase of prices raised our orchardists from the prospects of a total loss to an assured season of great prosperity. Apricots on the trees started at $15 per ton, and soon advanced to $20, then to $30, and for a short time were held as high as $40. Peaches took a like advance, and in a few days went from $20 to $38, while prunes sold at $35 to $45. Other varieties kept pace with the demand, and for all very good prices were received by the grower.

The result of the low prices of 1891 was to largely reduce the acreage of new land set to fruit in the season of 1891–92, and a much smaller area was set out this season than otherwise would have been. The present high prices will give a great impetus to the new planting, and the outlook at present is that a larger area will be set to new fruit during the coming season than during any one season in the past. Carefully compiled statistics by this department show 274,377 acres in bearing, and 131,617 acres not yet in bearing. Of this amount 95,635 acres are in raisins and table grapes, leaving a total in fruit trees of 310,359 acres. Of this 49,055 acres have been planted during the past season. It is probable that the plant of the coming season will exceed this by 25 per cent.

In view of the enormous area in fruit in our State, which is being increased by large annual additions, there are many conservative people who view the future industry with dread. These forget that the history of the past shows that markets always open to us as fast as we can produce enough to command them. In the earliest period of fruit growing in our State, when we had but the local market, the man who had the temerity to plant a whole 5 acres to fruit was considered as rashly preparing to overstock the market; and when less than twenty years since we made our first shipments East it was predicted that the supply of the next few years would certainly greatly exceed the demand. But California fruit gradually became known in the East, and from an occasional carload the export grew to train loads, and still there are but a very small proportion of the people of the United States who ever taste, or even see California fruit. As our new orchards come into bearing we will naturally reach out for new markets. The increase for the decade ending with 1890 was: of dried fruit in 1880, 590,980 pounds to 64,595,181 pounds in 1890; and of green deciduous fruit, 5,185,650 pounds in 1880 to 68,084,124 pounds in 1890. The shipment of citrus fruits was not worth recording in 1880, but from 1882 to 1890 it has sprung from 917,000 pounds to 20,811,560. Raisins have increased in the same time from 790,630 in 1880 to 41,120,330 in 1890. These are shipments over the Southern Pacific system alone. In addition to these there were shipped by the Santa Fe system in 1890, 49,975,000 pounds of citrus fruits, 21,217,271 pounds of dried fruit, and 13,750,000 pounds of raisins.

These figures are given here to show the enormous and rapid increase in our fruit output, and despite it all, and despite the fears of the conservative minded, we have found an increased market for our entire product as rapidly as the supply has increased, until fruit growing is in a better condition to-day, with the vast area we now possess, than it was twenty years ago with the then limited area.

Touching upon the question of future markets for our fruit products, W. H. Mills, in an address before the State Board of Trade, outlines the following plan, which is produced here, as it gives some valuable facts and excellent advice:

"I find a prevalent opinion to exist, which is a matter of surprise, to the effect that California sells fruit to the East because of earlier conditions. It is the commonly received opinion that our fruits ripen at a different time, and that our sales in the East are made when the home product is unavailable. This is not true. The fruits of the East, when taken in their entire variety, ripen in the months of July, August, September, and October. Take the green fruit shipments of 1891. We shipped from California, in the green form, 3,420 carloads to the Atlantic States, Middle States, Western States, and the State of Colorado. Of this total shipment, 2,893 cars were sent forward in July, August, September, and October, the four months covering the fruit harvest period of the East, leaving but 527 cars for the months of May, June, November, and December. It is significant that we shipped no fruit in the months of January, February, March, and April, and but 22 cars in May; the first five months of the year, therefore, practically show no shipment. Our shipment begins in June, and more than 80 per cent of the entire shipment finds a market at the East, in the face of the domestic fruit markets of those States.

"In the brief address of a month ago, the opinion was vouchsafed that we had not placed our fruit within the reach of five millions of people. If this statement needs modification, it is in the direction of a reduction of the number. The early fruits reach the Eastern market at such rates as to make them luxuries. I have personally examined the market in the month of June, and found cherries selling at $2 50 per box, when they were being marketed in San Francisco at 35 cents per box. I have information to-day that California peaches are selling at 7 cents a peach in New York at the retail stands. It is not enough that our fruits are placed in the markets of the East; they must be placed there at such rates as will enable the masses of people to consume them. Considered in this light we have not placed our fruit, on an average, within the reach of one million of consumers.

"It was also stated, and from data which may not be disputed, that the orchards of California last year produced 300,000 tons of green fruit, which was shipped in the various forms of dried, canned, and green fruit, and found a market in the world. This statement will not be controverted, since it cannot be successfully. Within twenty years fruit shipment has grown to the enormous proportions herein indicated. The question we are considering is: How shall we so distribute the fruit as to bring it within the reach, physically and financially, of a large number of consumers? and the question is one of a simple proportion. If, at the present prices, and with the present facilities for distribution, we have found a market for 300,000 tons, and yet have placed the fruit, when the price is considered, within the reach of 5,000,000 people, may we not hope to double the market when we bring that product within the reach of twice that number, or treble it when we have reached three times that number?

"The whole subject opens a wide field for contemplation, when we consider the leading factors of the problem. First, we have an unlimited capacity for the production of fruit; second, we have economic advantages in its production which will enable us to offer it to 65,000,000 Eastern consumers at a price which will justify them in purchasing. Between the price paid to the grower and the price paid by the consumer there is a vast margin. The commission alone on the sale of our fruit is 7 per cent, and that of itself constitutes a market-seeking fund which should incite distributors to the highest activity. The present method of distribution is costly to the consumer, and all high cost to the consumer means a small reward to the producer. The higher the price paid by the consumer, the less the producer will get. High prices discourage consumption and enforce the condition of overproduction. So far as relates to green fruit, the commodity is exceedingly perishable. Commercially considered, every cargo lost is charged to the successful venture. Further examination into the subject convinces me that much improvement has been made over former years in the way of distribution. The more important intermediate stations are supplied with carload lots; but the general statement that the fruits are shipped in carload lots to the large commercial centers for distribution remains true. In the year 1891 we shipped to the Atlantic States 909 carloads of fruit. There are but five places mentioned, as follows: New York, 530 cars; Boston, 121 cars; Philadelphia, 11 cars; Baltimore, 1 car, and Buffalo, 1 car. Of these five cities, two receive 1 car each and one, a city of a million of inhabitants, receives 11 cars. There is a growing market for fruit west of the Missouri River. For illustration—of the shipments of 1891, Butte, Mont., received 48 cars, and Denver, Col., 150 cars. Can it be said of an enterprise that it has reached its full development when a market is found in New York City for 530 carloads of green fruit in the year, while in Philadelphia but 11 cars are used? Philadelphia has at least one half the population of the city of New York, while the climate and commercial conditions are completely analogous. But these 909 carloads, shipped to these Eastern centers, pass through towns, villages, and cities whose population in the aggregate is equal to the population of the cities to which the fruit was consigned.

"Briefly, then, what is proposed is a system of direct distribution. It is evident that the 1,142 carloads of green fruit shipped to Chicago were reshipped, and this is the feature to which objection is raised. If a carload of fruit was shipped to Chicago, and was subsequently reshipped to Milwaukee or Minneapolis, an additional profit to the middleman ensued. Thus the fruit was burdened with a price that placed a limit upon its consumption. It will be gratifying to the members of this Board to know that the proposition of direct shipment to all the centers of the East, great and small, instead of shipment to commercial centers for secondary shipment or redistribution, has met with concurrent favor at the hands of the press and the people of California. The transportation companies of the country stand ready to second any improvement which may be devised, or be sought to be applied, by the consignors of the freight. The present facilities for freight shipments from the Pacific Coast to the Eastern States constitute the cheapest service, when rate and speed are considered, that is performed by the railroads of the United States.

"This great concession to this industry by the railroads of the country stands fully acknowledged by shippers engaged in this species of merchandise. The determination of methods of distribution of any species of merchandise does not lie with the carrier; it belongs to the shipper only. Fruits are shipped by order of the consignor, and are secured to the consignee. The vast system of network of railroads, connected by the long-distended lines which reach the Pacific Coast, stands ready to perform the carrying service, and has actually performed this service at the minimum cost of movement alone. A better system of distribution is therefore not obstructed, either by the rate at which the fruits are carried, or by want of liberal facilities for the carriage. Distribution is the office of merchandise. The problem to be solved is therefore a mercantile problem, to be solved by the merchants engaged in this great enterprise, and not by the carrier who carries the fruit to its proper consignment according to order.

"What is sought is a market commensurate with the possibilities of production in this State. The magnitude of the opportunity is appreciated only by those who have given the subject thoughtful attention. A single purchaser of dried fruit in the city of San Francisco purchased in the space of one month $1,000,000 worth of fruit, and even the recitation of this fact does not disclose fully the vast volume of business possible to that industry.

"The next consideration relates to the profit of fruit growing. A profit equal to $1 a tree, or half that sum, or a quarter that sum, will confer upon our commonwealth a profit far in excess of that attending any other cultivation of the soil. We are enjoying in the current year the highest prosperity the fruit growers have known, and yet the whole enterprise has made its way against continued predictions of overproduction and ultimate failure.

"The magnitude of the opportunity also suggests at once the possibility of a special equipment and special treatment of the whole subject. We are in plain view of the ultimate possibilities of this industry, and the time has arrived when we may safely prepare to adopt such methods as to its commercial features as will take it out of the list of ordinary commercial transactions, and justify the inauguration of separate and special instrumentalities of distribution. In its practical aspect the proposition demands the formation of a commercial company for the sale and distribution of the fruit. The auction method having proved successful, it is practicable to send to every town or city in the United States, where a market for a single car might be found, a carload of fruit to be sold at auction; and this fruit should be sent directly from the centers of distribution in California, and regardless of centers of distribution at the East. As supplemental to this, it is competent over Eastern lines to distribute fruit in less than carload lots, over short distances of distribution. Thus continuing the present method of sending all fruit to the great commercial centers of the country for which a market might be found, let it be supplemented by a distribution in less than carload lots through the instrumentalities of local railroads everywhere. When that is accomplished, a process of the steady growth and expansion of the industry will have set up. It will have become organic, and, obeying the law of all organism, will continually grow. It will offer a competition to the growth of fruits in climates not favorable to their production, which will eventually give us absolute control of the markets now being supplied by Eastern producers. This is true, because it is true in modern economic methods that, notwithstanding the distance intervening between points of production and consumption, every article is being produced in the soil and climate and under the conditions most favorable to its production. It is absurd to suppose that this law of modern economics is not equally applicable to the production of fruit in California, when the favoring conditions in this State are understood, or when they are contrasted with the unfavorable conditions of other portions of this country. The very contrast closes the argument.

"General farming, however profitable, can never confer population. Whether true or false, it is a leading tradition of general farming in this State, that its highest profit is derived from large aggregations of ownership. These large aggregations have taken place, and the tendency is constantly in the direction of still greater consolidation of ownership, and constant depopulation of the country. On the contrary, the industries connected with the orchards, vineyards, and gardens of California have an inherent tendency of segregation. Ten acres of orchard, vineyard, or garden will afford profitable employment to fifty times the labor which is expended upon 1,000 acres of ordinary wheat land in this State. The acquirement, then, by this commonwealth of a great substantial industrial foundation, lies plainly in the direction of availing ourselves of the peculiar advantages of our climate. The absence of cheap coal, that reservoir of mechanical power, forbids the hope of the establishment here of great manufacturing enterprises, with their density of population. In fact, as already shown, the successful establishment of a basis industry will eventually confer upon us manufacturing facilities and incidental enterprises in every direction; for wherever a substantial industrial basis is established, diversity of profitable occupation arises as an inseparable incident of prosperity.

"Commerce is but an incident of industrial activity. The volume of commercial transactions, as relates to any people, is measured by their purchasing power, and the supreme source of wealth in any community is the productive capacity of its people. Horticulture, prosecuted under the unrivaled advantages which attend it here, leaves us without a competitor. Upon this substantial and enduring basis the entire industrial structure will eventually rise.

"The suggestion of a more distributive market for our fruit has elicited the widest discussion. It should not constitute a discouragement, that some conservatism of the old methods has developed. The California Fruit Union, now in successful operation, developed like discouragements. The auction plan, that has proved so valuable an adjunct as a market method, was established against the strong skepticism of those who had no experience of the method. Inquiry among experienced shippers of fruit, and those who have had observation of the present methods of distribution, has developed a great diversity of opinion. I content myself here with the introduction of a highly intelligent Eastern opinion on the subject. Prof. W. A. Henry, the Dean of the Agricultural College, University of Wisconsin, visited this State in 1886. He made a critical examination of our orchards and vineyards, and at that time expressed the opinion that when our orchards came into bearing we would reach a condition of overproduction. Since the last meeting of this Board I have had the pleasure of an extended interview with this gentleman. His views afford an opportunity to judge of this whole question from a highly intelligent Eastern standpoint. He says the State of Wisconsin has 1,600,000 inhabitants; that, except an occasional carload of fruit sent to Milwaukee, no California fruit has ever been made accessible to its inhabitants. Residing in the town of Madison, Wisconsin, a city of 15,000 inhabitants, he states that no carload, nor part of a carload, of California fruit has ever reached that city; and yet he declares that there is a market for fruit at that place in carload lots. The city of La Crosse, having 30,000 inhabitants, is cited as an example where no carload of fruit has ever been shipped. Discussing the general features of the suggestion, he declares that there is a market in Wisconsin for California fruit equal to the entire market found at Chicago in our former experience. By this same authority we are informed that for special occasions people throughout the State receive small lots of fruit by express, for which they pay enormous prices. They purchase California grapes at the rate of $200 per ton, and other fruit in like proportion.

"I close by quoting a very significant sentence from the interview with Professor Henry: 'The products of Wisconsin, Minnesota, the Dakotas, and the whole Northwest are naturally supplemental with those of California. We need your fruits. We cannot raise them at home. The attempts to plant orchards have proved failures. The orchards that have been planted are no longer tended, and are falling into disuse. I never saw but a single peach blossom in the State of Wisconsin. The peach tree that came under my observation reached the height of 3 feet and bore a few blossoms. That bloom was the only bloom I ever saw in the State of Wisconsin. I am not saying that Wisconsin is not a good State. We have a State rich in varied resources, but fruit is not one of them. Our present population of 1,600,000 can be converted into consumers of California fruit by placing it within their reach.'"

An effort was made during the summer to open out to our fruit growers a market in London, and to this end several shipments were made by the California Fruit Transportation Company. Arrangements were perfected whereby the steamers "Majestic," "Teutonic," "Britannic," and "Germanic," of the White Star line, extended the refrigerator service of the California Fruit Transportation Company to Liverpool and London. Each of the vessels above named was prepared to carry 5 carloads of fruit, and arrangements were made to ship this amount every week. Arrangements were also made with the Southern Pacific to send forward a special fruit train each week, to go through to New York in six days and connect with the steamers. The fruit all arrived in good condition and sold at fair prices. Out of the first shipment some samples were sent to Queen Victoria, who sent her acknowledgments of the same, stating that she had found it very palatable. Owing to the heavy storms prevailing on the British coast, the "Teutonic" was somewhat late in arriving, but the fruit, nevertheless, was in excellent condition.

Great crowds attended the sale, and the prejudice against "cold fruits" (fruits shipped in refrigerators), formerly entertained, is rapidly disappearing.

The prices obtained for the third shipment were as follows: Pears,

$3 to $3 75 a box; peaches, $1 75 to $2 25 a box; plums, $1 75 to $2 50 a box.

The fourth shipment left New York on the "Majestic" on August 16th, and the fifth shipment left Sacramento on the same date.

In speaking of his experiment at the time, A. T. Hatch, the originator of the scheme, said of it: "I believe it will be a success. Of course, I cannot now tell to a certainty, but I believe it will. I am advised that the fruit sent hitherto has arrived in good condition, and that is a great point. As for the statement cabled from London that the English merchants think the fruit sent in refrigerators will not keep long enough for them to get rid of it, that should not trouble California shippers.

"I had the same thing stated to me five years ago when I began shipping fruit in refrigerators to New York. Then they said it would not keep, that the fruit would all fall to pieces and decay as soon as it was taken from the refrigerators, but it did not do so. They found it would keep days and days in good condition, while the New Jersey fruit, run over in an hour or two, would go to pieces the next day.

"This train consists entirely of peaches and pears. I am sending no plums or prunes. On being delivered in New York the cars are put on lighters and conveyed at once alongside of the trans-Atlantic steamer on which the fruit is to be sent. Thirty minutes only are required to transfer it from the refrigerators of the cars to the refrigerators of the steamer. This does not give it much chance for the temperature to be changed.

"The first shipment of California fruit arrived in London a few hours less than fourteen days from the time it left Sacramento, and on the sixteenth day, and the seventeenth from the time it was picked, it was sold. Yet it was then in excellent condition. This shows to me that it will stand the shipment. The only thing is, can we get prices that will warrant the shipment? I believe that when the English people get to see fully what this fruit is they will want it. Anyway, it shall be tested fully.

"I will have about $30,000 in with this fourth train, including what I have sent before. It is a good deal to put in before results are fully known, but having begun, I am not willing to quit till the full facts are known."

Prices did not rule so high for our fruit in London as had been hoped, and the high prices in the Eastern States, combined with the comparative shortness of our own crop, gave to the experiment an unsatisfactory outcome. It has been demonstrated, however, that we can ship fruit to London, and that it will arrive there in good condition; and we have here an assurance of a market for our surplus, when from any cause, such as large crops in the East, or very large yields in our own State, our home markets shall become glutted. In view of the vast area of non-bearing orchards in our State, with the large plantings that will unquestionably be made in the near future, even the partial success of this experiment gives us the assurance of a fair foreign market for our fruits when our home market shall be supplied, and the assurance of an outlet for our overflow sets at rest the question of overproduction.

In commenting upon this matter of exporting fruits to England, W. R. Carson, of Santa Monica, who is well informed in regard to the English market, says:

"It would be a great boon to England, as well as advantageous to

California, if some of the fruits of this country could be put on the market there in good condition, and at prices that would command a market, but it is very desirable, to prevent mistakes, that the conditions of success should be well understood. Some of Col. Creed Haymond's statements, although to a certain extent correct, are yet very misleading; on some points he has got hold in some way of erroneous ideas that are equally misleading. Such as this: 'In London, fruit is practically beyond the reach of the masses, the prices are so enormous.' On the contrary, in London and other cities fruit is hawked about the streets in wheelbarrows at prices that artisans can afford. It is many years since pineapples from the West Indies began to be sold by these men at 2 cents a slice. In 1858 I sold from my orchard in a suburb of Manchester, Damson plums at about a cent a pound, selling to a dealer by the peck, on the tree. In 1875, in Chestershire, not 20 miles from Manchester, I was told on the spot that plums were so plentiful that they could not be given away. These were exceptional years, of course, but they show the necessity of care and caution. Canadian and United States apples are sold on the quays at Liverpool at $3 to $5 50 per barrel. Newtown Pippins are sold in first-class shops in Manchester at 8 cents a pound.

"With regard to peaches, very few are grown. Trained on a south wall, in a favorable locality, and well managed, the trees ripen their fruit, but the supply is very limited. They are also grown by gentlemen, under glass, for their home supply. There are quite as fine peaches there as here, but there is a market for quantity, if they can reach the market in good condition, at say 12 cents a pound up to 18 cents. The same may be said of apricots.

"Tomatoes are imported from Canada, as well as home grown, but possibly in the first three months of the year they would find a good market.

"Grapes do bring $1 to $1 50 a pound, but unfortunately the latter price is at the time when there is not a grape in California. Usually the lowest price for hothouse grapes is 60 cents per pound, when they are most plentiful, the finer qualities bringing higher prices of course. If the Muscat grape can be put on the market in Great Britain in good condition it will sell, but not in quantity, unless at low prices. From Spain are imported great quantities of a white grape called Almeria—probably from the name of the port of shipment—and the usual retail price of this grape, in Manchester, is 12 cents, rising to 16 as it becomes scarcer. It is so much inferior to the Muscat that the latter would bring 24 cents, and at that price would be in great demand, because it would reach a great body of people who could afford that price for family use—people who never buy hothouse grapes except for a party or an invalid. The growers here cannot get above 1 cent a pound, and between that and 24 cents there is a wide margin for expenses and middlemen's profits. There are no customs dues on green fruit. (On currants the duty is about two fifths of a cent per pound; on prunes and raisins it is not quite 1¼ cents.) My object in writing is to promote a trade beneficial to both countries, and in connection with that it is worth while to draw attention to the fact that in 1893 the ship canal will be opened to Manchester; that Manchester is a great fruit and vegetable market—the central market for a great extent of country, thickly populated, dotted with towns—and that ships of any size from an Atlantic port need not break bulk until they reach the quays at Manchester, where they will find a market equal to that of London."

Another experiment in marketing was made the past season in selling the fruit at auction. There have been complaints loud, deep, and bitter on the part of the growers against the middlemen, who have been charged with all sorts of unfair treatment. A way out of their power was sought for, and when the auction system was proposed it was generally indorsed by the growers as offering a means to escape from the exactions of the commission merchants, and a way of reaching the consumers without their intervention. Resolutions were passed by many fruit growers' associations, of which the following are a copy:

Resolved, That all present hereby agree that all fruit and vegetables sent to San Francisco for the open market shall be sold at public auction.

Resolved, That all fruit growers here present indorse the auction system of selling our fruit and agree to give it our hearty support.

Resolved, That we, as fruit growers, give the auctioneers our continued and hearty support.

In commenting upon this movement, the "Examiner" said editorially:

"The fruit growers will watch with lively interest the experiment of auction sales of fruit in this city. The condition of affairs in the San Francisco market has been unsatisfactory for several years to consumers as well as to producers, and both sides will welcome anything that will remove the causes of trouble. The San Francisco consumers have complained each season that it was difficult to get good fruit—that the orchardists unloaded culls and third-grade fruit on the city and charged first-class prices, while all the good fruit went East. Instances in which good California fruit could be bought in Chicago for less than was charged for an inferior article in San Francisco have been cited by the San Francisco consumer, to show that he was not being fairly dealt with, and he has clamored that as he was willing to pay a good price for the first-class article he ought to get it. The fruit grower has retorted that the San Francisco market got better treatment than it deserved; that he could not get more in it for good fruit than he got for third-grade; and that when he sent anything here he was just as likely to get a return from the commission merchant that the fruit had been dumped in the bay as to see any cash.

"The high prices to consumers and low returns to producers have brought out many suggestions for a remedy. Coöperation, by which most of the middlemen might be dropped out and the greatest expense saved, has been the most popular in theory, but nobody seems to have found any way by which the suggestion might be put into practice. The plan of forming a company to buy fruit in the orchard and sell direct to the consumer or the retailer, offered a good chance of profit to good business men, but no capitalists have been attracted to the enterprise.

"The auction plan of disposing of fruit has had many advocates, and the success met with in its operations in the East gives ground for their confidence in it. It is to be hoped that it will work as well here as in Chicago. If it can be fairly carried out it will remove the standing complaints of false returns. Prices at a public sale cannot well be manipulated or concealed. The publicity may do something, too, to keep the prices to the consumer and the returns to the grower from getting so far apart as in the past. At all events the experiment is worth trying. It is to be hoped that it may result in bringing to San Francisco good fruits at prices fair to both buyer and seller."

This method of disposing of fresh fruit was given a short trial and abandoned for the season, the reason alleged being that it was started too late in the season, after the canneries had been pretty well stocked, and as a result they were buying little fruit at the time, and the bidding was almost entirely by the commission merchants. Enough was done, however, to prove that there is a way to escape injustice, when such exists, on the part of the dealers, and to insure fairer treatment of the producer in the future. One of the heaviest fruit producers who favored the auction system, in speaking of the experiment, said in regard to it, upon its suspension:

"I know that the commission merchants of San Francisco have been sneering at the auctions from the day that they were introduced, and although they will deny that there was any concerted movement among them to render the scheme inoperative, I am fully convinced that there was such an organized movement.

"Of course the commission men have cried down the auction sales. It was striking right at the very root of their business. It was a fight to determine whether the consignments should be sold in a public place, where the terms were known to all, or whether the practice of private sales and private prices should prevail.

"Let the dealers say what they will, the auction system, had it been successful, would have been one of the greatest blessings to the producers that could be devised for their welfare and prosperity. I do not think that there is a single fruit raiser in the State who is at heart opposed to the auction plan, although there are a number of them who are not free to express their opinion in the matter, on account of their financial entanglements with commission houses.

"Let me tell you of some of the disadvantages under which the average grower is placed. I am speaking now of the poorer and middle classes, who, as a rule, are so situated that they wish to realize upon their crop the moment it is in a condition for marketing. There are but two avenues open to the producer—the cannery or the commission house. I will take up the cannery first. The grower, when his fruit is nearly ripe, takes a sample to the canner and submits it for inspection. A price of say $20 per ton is agreed upon, and the orchardist returns home satisfied that he is going to realize a fair profit on his crop. In a few days he picks his fruit and ships or hauls it to the cannery. Here his trouble begins. The Superintendent says that some very heavy shipments of the same kind of fruit came in the day before, and that the establishment is overstocked. He tells the seller to bring his goods next week. That, of course, is out of the question, as the fruit would spoil in the meantime. As a result, the unfortunate visitor is finally offered $10 per ton for his crop, and he has no other course but to let it go at that price.

"Again, the canner finds fault with the quality of the fruit, or it is either overripe, or not ripe enough. The same result is reached in this case. The grower has his fruit picked, has paid for cartage, and if it is slightly underripe (a condition required by the canners), he cannot send it to market. He must take whatever price is offered to him.

"I know that there are tons of fruit rotting in the orchards this year. The owners would rather lose it all than submit to the grinding, crushing tactics pursued by the canners. The men who can afford, however, to allow their crops to spoil, belong to the wealthier classes. Heaven help the man whose existence depends upon the product of his orchard.

"The commission house end is often just as bad as the canneries. The main trouble lies in the fact that the shipper is forced to depend upon the honesty of the merchant. So you see the shipper takes a risk in sending his goods to be sold on commission. I do not wish to be understood as making a sweeping charge of dishonesty against the commission men of San Francisco; there are many old established houses which have an honorable name in the community. What I wish to say is that the majority of the men in that business always get the largest and best end of their bargains.

"Another disadvantage to be encountered in sending goods to the commission men, is their proneness to neglect first consignments for the ones received subsequently. The later goods are sold off, and no effort is made to dispose of the earlier receipts. In this case the growers will probably receive a return something like this:

"'We sold ten boxes at $1 each, twenty boxes at 50 cents each, and the rest we were obliged to send to the dump.'

"The shipper in all cases must take the merchant's word for the price received for consignments. If the dealer is honest, the fruit man is liable to be justly treated. If the merchant is unscrupulous, the grower has no redress if false returns are sent, as he has no means of verifying his suspicions. How does he know that half of his goods rotted in the stores and was sent to the dump?

"If the merchants would be satisfied with smaller profits, and set their first prices at lower figures, a beneficial change might result. Many of them, however, hold out so long for tip-top prices that the fruit spoils on their hands.

"There is bound to be some change in these methods," concluded the gentleman, "but it will not be until the fruit men of the interior combine, and establish an agency in this city. Such coöperative establishments are conducted elsewhere, and there is no good reason why one should not be in operation in San Francisco."

Another effort looking to the more advantageous distribution of fruit on the part of the grower was made in the attempt to organize a Dried Fruit Exchange. The plan of this was that there should be a central exchange in San Francisco, coöperating with which should be local organizations in each county. By the efforts of this association it was hoped that uniformity in grading our fruits, and uniformity in prices could be secured, while a wider and better market for our products could be created by unanimity of action on the part of our producers. Santa Clara County has already organized a Dried Fruit Exchange, and its working has so far proved satisfactory, and it is probable that a State Exchange will be organized and in operation in time to handle the crop of the season of 1893.

At the meeting of the State Horticultural Society, July 29th, E. W. Maslin submitted the report of a committee, previously appointed, to consider the feasibility of establishing a Dried Fruit Exchange in San Francisco, to the effect that a meeting had been held with fruit growers, and others interested, to discuss the question, on July 7th, and it was the sense of the meeting that the season had too far advanced to begin the enterprise this year, but the following resolutions had been passed:

Resolved, That the scheme of establishing a Dried Fruit Exchange is feasible and necessary for the interest of the fruit growers of the State.

Resolved, That we advise the State Horticultural Society to appoint in each county having a dried fruit interest, a number of persons whose duty it shall be to canvass the county for the purpose of inciting an interest among the fruit growers in the project of establishing the said Dried Fruit Exchange, to establish an association of fruit growers in each county, where there is no county fruit association, and to ask the coöperation of associations already formed, and to induce the sending of delegates to a convention to be held in San José on November 15th, then and there to organize a Dried Fruit Exchange.

The recommendations in the report were adopted by the society, and the same committee, with the addition of the Secretary, was authorized to select names in the different counties and submit them for adoption at the next meeting of the society. Further action upon this subject will be taken at the next Fruit Growers' Convention, which will be held on November 15th of the present year, at San José.

Local organizations for the purpose indicated are also in existence at Pomona, in Los Angeles County, and at El Cajon, in San Diego County; these, so far as reported, have been successful in their operation.

THE ORANGE.

The area of land in citrus fruits has been very largely increased during the planting season of 1892, less proportionally in the southern counties than in other sections of the State. In Tulare County very considerable areas have been set to orange and lemon trees, which thrive remarkably well in the foothill region of that county, as indeed they do in the foothill belt of the whole Sierra Nevada range. The citrus belt of California has been gradually widening, as experience has demonstrated that the fruits of this family would thrive over a much wider area than was originally believed. Very large plantings have been made in Butte County, and already some considerable returns are promised from there. In Placer County a number of orchards are already in bearing, and others are coming on. In fact, the orange and lemon will grow and flourish in sections in the greater part of the San Joaquin and Sacramento Valley counties as far north as Shasta. While this is true, the extreme southern counties produce so very large a proportion of the output of fruit as to be entitled to the designation of the citrus section of California.

The following able review of the orange season of 1891–92, from the pen of Harry E. Ellington Brooks, covers this subject thoroughly:

"The shipments of oranges and lemons from the six southern counties during the season of 1890–91, aggregated 4,593 carloads, or 1,312,099 boxes, divided as follows:

	Carloads.
Los Angeles	2,212
San Bernardino	1,708
Orange	516
Ventura	68
San Diego	66
Santa Barbara	23
Total	4,593

"Of these, about 4,000 cars were oranges, the balance lemons. The home consumption was probably 900 boxes, which brings the total to 5,500 carloads, or 1,650,000 boxes. At $2 a box net to the grower, the revenue from the Southern California citrus crop of 1890-91 was $3,300,000.

"The season of 1891-92 opened auspiciously. There was every prospect of a good crop, considerably in excess of that of the previous year. The estimates ran from 5,000 to 6,000 carloads. Then came a disastrous wind storm about the middle of December, closely followed by heavy frosts during Christmas week, and all the calculations were rudely upset. The wind was particularly destructive in some of the choicest orange-growing sections of San Gabriel Valley, not only blowing off and bruising thousands of boxes of fruit, but in some cases even whipping the leaves from the trees. The frost, on the other hand, did its worst in some of the most highly regarded orange sections of San Bernardino County, which the wind had measurably spared. although the effects of the freeze were more or less visible throughout Southern California.

"It will be some months yet before the railroad companies make public the exact figures of the season's shipments. In a letter written on January 15th, after it was possible to estimate the damage by frost and wind, I ventured the assertion that the shipments for the season would not vary greatly above or below 3,000 carloads. A careful investigation, which I have recently made among shippers, now justifies me in stating that the aggregate shipments will be within a few carloads of 2,800, a falling off of 1,600 carloads, or about 35 per cent from the shipments of the previous season, instead of an increase of over 20 per cent, as was anticipated early in the season. Or, in other words, the crop was just half what it was expected to be at the beginning of December last.

"Of these 2,800 carloads it is safe to say that at least 800, probably many more, were more or less frosted or wind damaged, and ought never to have been shipped. Moved by a strong demand from the growers, who found themselves with damaged fruit on hand upon which they were anxious to realize something, a temporary reduction was granted in rates from California to Chicago of 35 cents per 100 pounds, making the rate 90 cents. The representatives of the Southern Pacific and Santa Fe companies at first wisely opposed the proposition, on the ground that the shipment of windfalls and frost-bitten fruit would spoil the reputation of California oranges in the East. Shortly afterward, however, at the end of January, the Santa Fe Company, seeing its way to capture some extra business, put the reduction into effect, and its rivals were forced to follow suit. The reduced rates lasted only about two weeks—seventeen days on the Santa Fe and fifteen days on the Southern Pacific.

"Seven hundred cars were shipped to Chicago under the 90-cent rate, all consisting of more or less damaged fruit. Some of the oranges were so badly frosted that they actually dried up and wouldn't even rot. These shipments proved a dear experience to the growers who made them. In a number of cases they were called upon by the consignees to pay the freight, and were thus worse off financially than if they had not made the shipments. The immediate loss is, however, trifling compared with that which must result from the bad impression made upon Eastern consumers. It will take years to convince many who tasted California oranges this year for the first time that we can grow oranges fit to eat. The shipment of this damaged fruit was a grave mistake.

"At the opening of the season local buyers held off, offering to ship on commission, but not to buy for cash. Later, when they began to buy, prices opened fair, ranging from $1 a box for good Seedlings to $2 50 for good Navels on the tree. A revulsion occurred after the shipment of so much damaged fruit to Chicago, and for a time it was almost impossible to sell at any price. The market was demoralized. During February, March, and the early part of April few shipments were made. Buyers then began to purchase, on the ground that the worst fruit had been disposed of, and prices advanced 25 per cent. Those who kept their fruit until the close of the season did fairly well, obtaining better prices, although for a much smaller crop. Navels are now worth about $3, and Seedlings from $1 25 to $1 40. There are few in the market. The regular shipping season is supposed to close June 30th.

"From the above it will be seen that the past season has been a disastrous one to the orange growers of Southern California. It will, however, be a great mistake to suppose from this that the orange-growing industry in Southern California is not a desirable and profitable one, or that the orange growers are seriously discouraged. The chances are small of the early recurrence of such a combination of misfortunes. Moreover, those who are planting new orchards can, by studying the lessons of the past season, reduce the ill effects of such visitations, should they occur, to a minimum. The three most important of these lessons are the necessity of planting windbreaks, of selecting true citrus locations for orchards, and of shipping only first-class fruit in good condition.

"The necessity of windbreaks, which has been preached by many for years, is now generally admitted. This is anything but a windy region, but it is evident that we must expect a blow of more or less violence every few years. There was a similar visitation just three years previous to the one of last December. A triple row of eucalyptus trees, with a cypress hedge on the inside, will greatly modify, if it does not entirely avert, the disastrous effects of a heavy wind. Shortly after the December storm it was easy to note the difference in the appearance of trees thus sheltered, or sheltered by buildings, from those which stood exposed. Many orchardists say they cannot afford the space occupied by windbreaks. It is for them to decide whether it is more profitable to risk losing the bulk of their crop every few years than to sacrifice a row of trees. The drain on the soil near the gum trees can be met by a more liberal application of manure and water. Of course, in localities that are naturally sheltered, there is less need of such artificial aid.

"The selection of a suitable site for an orange orchard is the most important point of all. Many orange groves have been planted in sections where nature never intended an orange tree to grow. We are at the best on the northern edge of the true southern citrus belt, and extra care is therefore necessary in selecting a site. Unfortunately there has been and still is much misrepresentation on this point. When orange land with water is worth $350 an acre, while adjoining land, also with water, but not suitable for oranges, is only worth $150, the temptation is great for land owners to let the citrus belt out a hole or two. Buyers cannot exercise too much caution in this respect. Because an orange tree will grow and bear fruit in ordinary years, it does not by any means follow that the orange is a safe crop to grow in that locality, as many have discovered to their cost this season. In some cases the distance of a few yards, with a corresponding difference in elevation, marked a plain dividing line between young orange trees wilted brown on the one hand and bright green on the other.

"As to the third point—the shipment of inferior or damaged fruit—shippers who burned their fingers last season are not likely to repeat the mistake. There is room for much improvement in the methods of marking boxes of oranges. Hitherto it has been the custom with some shipping houses to mark all the best fruit, wherever it was grown, 'Riverside,' a manifest injustice to other sections where just as good fruit is produced. A bill has been prepared and will be introduced at the next session of the Legislature, making it a felony, punishable by fine or imprisonment, to brand a box of oranges with the name of a different locality from that in which the fruit is picked and packed.

"The planting of orange trees in Southern California during the past season has been heavy, though not quite so heavy as in the previous year, which witnessed the most extensive planting ever known in this section. Had not some persons been temporarily discouraged by last winter's experience, the area set out would undoubtedly have been fully 25 per cent greater. To show how extensive the planting has been of late, it is only necessary to mention that the total acreage of orange orchards in San Bernardino County at the close of 1890 was 13,070 acres, while by the end of 1891 it had risen to 19,673 acres, an increase of 50 per cent. Previous to last season's planting there were, in the six southern counties, 3,800,000 orange trees, divided among the counties as follows:

	Bearing.	Non-bearing.
San Bernardino	400,000	2,000,000
Los Angeles	475,000	550,000
Orange	82,000	51,000
San Diego	27,000	177,000
Ventura	8,600	55,000
Santa Barbara	6,700	37,500
Totals	999,300	2,870,500

"Estimating the planting of the past season at 1,000,000 trees—a moderate figure—and transferring 1,000,000 from the non-bearing to the bearing column, this gives as the number of orange trees planted in Southern California, in round figures, 2,000,000 bearing and 2,870,500 non-bearing, a total of nearly 5,000,000, covering about 50,000 acres, or a little less than 80 square miles.

"There were about 500,000 lemon trees growing a year ago, which number has been at least doubled during the past year, there being quite a rage for lemon culture at present, owing to the introduction of a successful method of curing the fruit. When, in three or four years, all these trees shall be rated as bearing, and we add this aggregate to those now in bearing, we shall have a grand total of 6,000,000 orange and lemon trees, with as many more coming on, should planting keep up at the present rate. If the average production should still remain a box and a half to the tree, and the average price the same as now, we may look for a gross revenue of $18,000,000.

"These figures appear large and naturally lead to the inquiry: Is there any immediate danger of overdoing the orange industry in California? I think not. The product of these 5,000,000 orange trees in 1895 will give only two oranges a week, during the six months from December to May, to each family in the United States. During these months California has no serious competitor as an orange-growing section. The Florida crop comes in earlier than ours. Mexico raises some fine oranges, but they are in the market even earlier than those from Florida, and besides have to pay a duty. Sixty-one carloads were shipped from Sonora last season to the United States. Large California Navels sell for 25 cents apiece in the City of Mexico. A good many orange trees have been planted recently in the Salt River Valley, Arizona, and some oranges have been placed on the market, but with due respect to the manifold resources of that region, I think that it is too far from the ocean, and, consequently, too liable to winter frosts, ever to become an orange-growing country on a large scale. The Yuma section, lying nearer to the Gulf of California, is better adapted to the industry, but in any case Arizona oranges would be out of the market before the California crop is ripe. There remain the Pacific Islands, but as those oranges have to be picked green, it will be difficult for them to compete with ours.

"It will therefore be seen that from December to May, at a period when the market is comparatively bare of deciduous fruits, California orange growers have the markets of the North American continent to themselves. When it is further remembered that, as shown above, the area of first-class citrus land in California is quite limited, that much of this will be devoted to the culture of the lemon, and that new markets are constantly opened up, it becomes clear that there is little reason to anticipate overproduction. It must, however, be expected that prices will shade off a little after a few years. At half the present prices orange growing would still be a highly profitable industry. Decreased prices will, on the other hand, stimulate consumption. Unlike corn, beans, or other staples, the orange market is elastic, the consumption depending almost entirely on the price at which the fruit can be placed in the hands of the consumer.

"Freight rates play an important part in this question. The present rate to Chicago is $1 25 per 100 pounds, about $202 a car, or 87 cents a box, which is almost as much as the grower receives for ordinary Seedlings on the tree. The opening of the Nicaragua Canal would give a great stimulus to the export of our oranges to Atlantic points, and enable us to ship them to Europe at a profit.

"As to varieties, the Navel still holds its own as the king of oranges, and is the most extensively planted. A disadvantage is the large size of the fruit for the general trade. It is also considered less resistant to frost than the Seedling, and some have an idea that it becomes a rather shy bearer as it grows old. The Seedling sells at about half the price of the Navel, but yields nearly twice as heavily. However, one rarely hears of any Seedling trees being planted nowadays, with the intention of leaving them so. Next to the Navel in merit may be classed the paper-rind or thin-skinned St. Michael, a fine-flavored orange, with good keeping and shipping qualities, of uniform, small size, just right for the retail trade. The Ruby Blood, with flesh of even darker red than the Maltese Blood, commands a high price at present. The Mediterranean Sweet varies much in quality and has somewhat lost caste of late. Many growers are planting the Valencia, a very late orange, which ripens in July and August. It is a fairly good orange, which keeps and ships well. A year ago a carload of this variety was sold in Chicago at $7 a box, but when 10 carloads were shipped the market weakened. It is doubtful whether it would be safe to plant many of this variety, as there is little demand for oranges when the market is well supplied with deciduous fruits.

"From year to year growers are learning much as to the proper treatment of the orange tree. The industry is still quite a young one in the State, and we have yet much to learn. It has been found advantageous to trim the tree low, letting it assume more of the character of a great bush. In this manner it bears earlier and more heavily, and the ground around the trunk, as well as the trunk itself, is shaded. Another lesson that has been learned is that we have been budding too early at the expense of the vitality of the trunks. Some growers in the Redlands country will wait until their Seedlings are five years old before budding them. In this manner they will secure fine, vigorous trees that will withstand much hard treatment or adverse weather.

"There is quite a discussion at present as to whether it is best to use the sweet California or sour Florida stock. For the latter it is claimed that it is freer from root diseases, and does well in low, damp localities. On the other hand, it may be said that sensible men do not plant oranges in California in low, damp localities; besides which, it appears that the sweet stock in California makes larger and more vigorous trees than the sour. Dealers who import Florida stock are, of course, in favor of that variety, which is sold at lower rates than the home-grown Seedlings. Another lesson that most of our growers have at length learned, is the necessity of fertilizing orange orchards, especially after they begin to bear. A crop of oranges extracts an immense amount of nutriment from the land, and it must be replaced or the trees will inevitably suffer.

"Last year the Fruit Growers' Union of Southern California was inaugurated for the purpose of endeavoring to establish a home market by local auction sales; also, to systematize shipments to the East so that our own products might not be brought needlessly into competition with themselves, and to open up markets east of Chicago which have as yet scarcely been touched. The disasters of December put a temporary damper on the project and the operations of the organization during the past season have not been important or very profitable. There is need of some such organization to look after the interests of growers, but, as a rule, it is very difficult to get horticulturists to pull together.

"Orange growing in California is an attractive and profitable occupation, but it should not be forgotten that it is a business which demands a considerable amount of capital. First-class orange land, with a good water right, is worth from $300 to $400 an acre in Southern California, and two-year old budded trees, ready to plant, are worth $100 an acre more. Adding the cost of planting, irrigating, and culture for three years, until the trees begin to bear, brings the lowest cost of a young bearing orchard close to $500 an acre, without reckoning interest on the money invested. On the other hand, the profits, in an average year, if the orchard is well cared for, are large—perhaps not so large as some land owners and real estate agents would have us believe, but large enough for any reasonable investor. One hears of $1,000 an acre. Such profits, and even more, have been made in rare instances from old bearing orchards, but it is not safe to reckon on such figures. A conservative estimate is to calculate on making the expenses of care, cultivation, and irrigation the third year, $100 an acre the fourth year, increasing gradually during the following ten years to $500 an acre, or thereabouts. An orchard of good trees planted in a first-class citrus location, with plenty of water and good care, will often do much better than this, and should never do worse. After five years the owner of such a 10-acre orchard can take life easy. But he must have $5,000 to start with unless he is a thoroughly practical man, who can do his own work and make a living from his land while the trees are maturing. In such case, by purchasing the land on easy terms of payment, he may get along with less money, but the work will be hard."

THE LEMON.

The lemon is rapidly growing in popularity as an orchard fruit, and during the past season very large plantings of lemon orchards have been made, especially in Tulare, San Diego, and San Bernardino Counties. This is justified by the large demand for this fruit and the prices paid for it. San Diego has given more attention to this branch of horticulture than any other one county. At Chula Vista, in the spring of 1892, over 500 acres of lemon and orange trees were set out, until now there is a total of 1,000 acres of growing citrus fruits. Last year a few older trees came into bearing, and the result was a total crop of about 300 boxes. This season all the four-year olds and the greater part of the trees planted three years are bearing well, and a careful estimate of this season's crop places it at about 1,200 boxes. Within the next six years there should be 1,000 acres of bearing citrus fruits, mostly lemons, in one solid tract, and less than one hour's drive from San Diego.

An acre of lemons is considered a very poor average if it does not yield at least a carload of fruit. This would be less than four boxes to the tree, and there are many three-year old trees there that will do as well this year, and even better. This fruit, when cured, is worth at least $2 a box, or $800 an acre. The 1,000 acres should then yield something like a gross annual income of $800,000, to be divided among one hundred and fifty producers, or an average of $5,333 each. These statistics are based upon the assumption that the planting of orchards has ended there, while in fact this is only a beginning of what may confidently be expected. Contracts have already been let for planting 400 acres the coming season.

The lemon is far less hardy than the orange, and the area suitable to its growth is therefore more restricted, and localities in which the orange would thrive are therefore frequently unsuited to the lemon. Mistakes have thus been made in planting the lemon in places too much exposed to frost or wind. But the causes which have led to the hitherto low estimate of the California lemon are twofold: First, the best varieties of the lemon were not originally planted in California. As a result of this a coarse, thick-skinned fruit was produced, having but little juice, a very bitter rind, and often bitter pulp also. Such a monstrosity was put upon the market after having been pulled ripe and yellow from the trees. Such fruit met only with derision when compared with the smooth, well-cured, thin-skinned, aromatic lemon of

Italy, and of course was a failure. Such was the earlier California lemon.

The grave error of planting the coarse seedling lemon was at length discovered, and such trees as had not been destroyed in disgust were largely budded to better varieties, as the Eureka, the Lisbon, and the Villa Franca. These trees produced a better fruit, and it was received far more kindly in the market; but yet it fell very far behind the best foreign fruit, and was unsatisfactory. As years passed, it was learned that the fault was mainly in the handling and curing. Nothing was really known of the best methods of curing and handling lemons until it was learned from hard experience by the foremost growers in the State, as G. W. Garcelon, of Riverside, and N. W. Blanchard, of Santa Paula. They and others found that success in lemon culture depended principally upon the manner in which the fruit was prepared for the market. It was easy to grow lemons, but to get them into the market in such condition as to make the business profitable was found to be quite another affair.

It was found that by cutting off the fruit when of a certain size, and before it had begun to turn yellow, putting it carefully away in a cool place until fully cured, it could be placed beside the foreign fruit without bringing a blush to the producer. The utmost care in handling is now known to be imperative. Treat lemons as eggs, and handle them accordingly. If one is dropped, even a few feet, upon the ground, reject it, for it will surely go to pieces before it can properly be sent to market. Approved systems are now widely known, and no fears need be felt on that score by those who would plant lemon trees.

The lemon crop of California is by no means large as yet, but is sure to increase rapidly from now forward. Too great care cannot be exercised in selecting a site for a lemon orchard. Except in a region practically exempt from damaging frost for the most part, and having a good soil and abundant water supply, avoid lemon planting. With all the favoring conditions, however, which may be found in several places in California, there is still ample room for a considerable additional area to be devoted to the production of this fruit, which is growing rapidly in public favor. The California crop has been estimated at a hundred thousand boxes for last year, but this is probably a very high figure. The difficulty of securing exact figures is found in the fact that the orange and lemon shipments are generally counted together.

The whole area planted to lemon trees in California is 10,056 acres.

Probably 95 per cent of all the lemons consumed in the United States come from foreign countries, chiefly from Italy. During the past eight years these importations have steadily increased, and have reached nearly 2,000,000 boxes, of say 300 lemons each, during each of the past two years. The total customs valuation of the lemon imports for the eight years ending with June 30th last, is $27,814,174, or an annual average of $3,476,772, but divided by years as follows: For the year ending June 30, 1885, $2,510,426; 1886, $2,608,810; 1887, $3,835,147; 1888, $3,395,983; 1889, $3,189,534; 1890, $3,374,032; 1891, $4,351,970; 1892, $4,548,263. From these figures it will be seen that the imports of foreign lemons have steadily increased during recent years, notwithstanding the increasing quantity of the home product. It will also be observed that the consumption of this fruit has apparently nearly doubled since 1885, and should this ratio of increase continue, it would be many years before any possible California product could supply the entire consumptive demand in this country.

D. H. Burnham, of Riverside, who gives especial attention to this fruit, sent samples of his lemons to H. E. Van Deman, Chief of the Pomological Division of the Department of Agriculture at Washington, and received the following report concerning them. This will apply to California lemons generally, where proper care is paid in growing, picking, and curing them:

WASHINGTON, D. C., September 3, 1892.

D. H. BURNHAM, *Riverside, Cal.:*

DEAR SIR: Yours of the 28th ultimo and the two boxes of lemons received in the absence of Professor Van Deman, who is now in Colorado. These specimens are very fine. The color is better than any others that I have seen, and better than many of the imported lemons now in market. If you can produce this crop in large quantities so as to establish its reputation in the market, I think you will find it exceedingly profitable. We have just made a rough test with specimens from this lot which you sent, and other specimens secured at one of the leading groceries in this city, which cost in the New York market $8 per box of 300 by actual count. We selected specimens of exactly the same weight, and find that the California specimens yield fully 33⅓ per cent more juice, is much more free from rag, and has a thinner skin than the imported garden-grown, velvet-skinned Sicilian lemon. I think it would be well for you to place some of your fruit in the Eastern markets, with a view to opening the trade and creating a demand for the fruit that will stimulate your people to plant more largely of it. Permit me to thank you for your kindness in this matter, and to say that we will be glad to be of service to you in any way possible in the future.

Very truly,

W. A. TAYLOR,
Acting Pomologist.

G. W. Garcelon, whose experience and success in lemon culture are well known, in his report on the lemon, published by this department, lays down explicit rules for its treatment. This report has been widely circulated, and has done much toward giving a forward impetus to this important branch of fruit growing. The following are the rules given by Mr. Garcelon, condensed from this report:

Select the highest and driest part of your citrus orchard for the lemon. Lemons require a location comparatively free from frost. Each locality and each orchard should produce that to which it is best adapted.

See that the ground is properly leveled. Break up deeply, so that the roots of your trees may have the benefit of subsoil. Plant not less than 25 feet apart each way. Dig holes 2 to 2½ feet in diameter. Have your trees taken up with soil, and be sure that the roots are properly sacked. Cut clean from ball of soil all mangled roots. As the growth of the lemon is more rank than that of the orange, it suffers more injury from exposed or bruised roots. When the hole is nearly filled, run in water and finish by putting on a few shovelfuls of dry dirt after the water has soaked away. Plant at the time the tree is starting its new growth, in March or April.

The Lisbon is a favorite for rapid growth and form of tree, profuse bearing, well-shaped, uniform fruit of good appearance, plenty of acid, and good keeping qualities. The Eureka is good, but not so attractive in appearance or so uniform as the Lisbon, and somewhat more tender. All kinds are best when picked from the tree before they are too mature and when the pulp has become fibrous and bitter. It is a good plan to set seedling orange trees and bud after they have been in the orchard a year or two. Time will tell which are the best varieties.

The main points are to remove suckers and shorten in such branches as grow too rapidly and incline to throw the tree out of balance. Every year clean out any wood that has passed its usefulness, or that is too thick. The best fruit comes from the outside of the tree and nearest the ground.

Lemons on good trees should be picked when two and one half inches in diameter. One half to two thirds the fruit should have attained this size somewhere from October to December. Every three or four weeks the trees should be gone over for fruit of proper size until all is gathered. Color cuts no figure; but for this rule to hold good, the tree must be in good condition and the fruit of proper size and thoroughly gathered at each picking. Pickers should be very careful men, well provided with ladders, and with baskets lined with burlap, each holding 60 to 75 lemons. A suitable wire hook to fasten the basket to the ladder is a convenience. Baskets are very carefully emptied into picking boxes, generally 9 by 15 by 24. The fruit should be carefully clipped, leaving a short stem, and avoiding the least bruise. The fruit should not be exposed to the sun, and should be carried to the hallway of the lemon house on the day of picking.

Herein has been the great difficulty hitherto in making lemon culture a commercial success. The essential features of the curing house are plastered rooms inside a closely-boarded and ventilated structure. A hallway runs around these rooms, giving easy access and providing a place where the fruit can be stored for a few weeks until it has thrown off the excess of moisture, and the injured fruit has had time to develop imperfections so that it may be rejected, and avoid injury to the others. Inside rooms of the house should have tight doors and arrangements for ventilation.

First store fruit in outer hall, and after the excess of moisture has passed away (say four weeks in winter and two in summer) place them carefully on trays, only one deep, and stack up the trays in the inner room. Raisin trays are often fitted up with extra cleats for this purpose. They are kept on these trays four to ten months, until ready to market.

Lemons thus treated have been favorably received by the trade, and have brought fancy prices, reversing the former prejudice against California lemons, mainly occasioned by former improper curing. There still remains some uncertainty as to the fruit reaching market in uniformly good condition. This is one of the problems of the transportation question which we hope may receive an early solution.

THE APPLE.

Apple growing is a more important industry in California than is generally believed. Careful estimates show some 10,000 acres planted to this fruit in our State, and very large quantities are exported. Our principal foreign markets for apples are found in Australia, the Islands, and Central America. In a very large part of the State the apple is the principal fruit grown. Del Norte, Humboldt, Siskiyou, Modoc, Lassen, Marin, and Santa Cruz Counties are all large producers, and the fruit grown here possesses as good eating, keeping, and shipping qualities as that of the Eastern States. All through the Sierra Nevada and the Coast Range there are large bodies of land eminently suited to apple growth, and wherever it has received proper attention it has amply repaid the care bestowed in its cultivation.

As indicating the importance of the apple industry in the northern part of the State, Humboldt reports shipments in 1891, 547,600 pounds; Del Norte, 330,000 pounds; Siskiyou, 420,000 pounds, and Lassen, 200,000 pounds, giving a total of 1,497,600 pounds from these four counties. The crop of Del Norte and Humboldt Counties finds its market principally in San Francisco; that of Siskiyou is shipped to Idaho, Montana, and the Eastern States, while Lassen ships to various points in Nevada and also to Southern California.

The largest apple orchard in the State is that of Senator F. C. De Long, at Novato, in Marin County, and covers 150 acres of land. The larger part of the output from this orchard is shipped to Australia, where it arrives at a season when the native crop is out of the market.

Another large apple-producing county is Santa Cruz, and very large quantities of Santa Cruz apples are sold in the San Francisco market. In all the mountain counties the apple is the principal fruit crop, and in most of the foothill counties it is an important factor, while even in the valley counties and in Southern California it holds an important position.

As our State becomes more densely populated, as the lower lands become absorbed, the large holdings cut up and settled, population will be forced to the mountain valleys and cañons, and then apple culture will take a prominent stand in California horticulture. It flourishes at high altitudes, and our best fruit is grown there, and our mountain ranges are filled with localities suited to the apple, which now lie idle for the reason that cheap land within reach of civilization and near the great centers of transportation can be had, and this land is generally more fitted to other fruits than to the apple.

Reports from all parts of the State indicate a shortage in the apple crop this season. Like other fruits, the apple was injured while in bloom by late rain and severe weather, which chilled the young fruit and caused a great deal of it to fall. As a result the crop will not exceed two thirds of the average.

THE APRICOT.

The apricot did not give a full crop this season, and in some portions of the State this shortage amounted to a total failure. Taking the entire State, however, it can be reported as fair. In the principal apricot sections the extra size of the fruit almost compensated for the lack in quantity.

At the Sutter cannery 145 tons of apricots were put up this season from fruit grown in the vicinity, and Manager Pratt, in speaking of them, stated that it was the finest fruit ever put up by the company, being extra large and uniform in size.

In Santa Clara County the apricot crop did not develop as it promised, and prices advanced rapidly and almost wildly, running from $30 per ton for drying fruit to $35 and $40, and for special order a still higher price was paid, $45 to $50 in some cases.

Commenting on the shortage in the apricot crop of Santa Clara County, the San José "News" of August 4th, said:

"The apricot harvest is now practically ended, and a pretty fair estimate of the crop can be made. It is quite apparent that it is not, by a great deal, as large as was expected. Those who have visited the different fruit districts have been impressed with the deserted condition of the drying grounds. Many of them are entirely destitute of fruit, while others, that are usually crowded for room, present but a beggarly array of empty trays. Several of our public driers have been accustomed to depend on the culls of the canneries for their fruit. Ordinarily this source has afforded them an ample supply; but this season it is different. The canners have let go of nothing that they could possibly pack themselves, and the driers have had to go without. It is a fair estimate to say that nine tenths of the dried apricots of this season are in the hands of the growers. This practically places the dried apricot market in the hands of the producers. Two years ago there was a better crop here, and the Eastern orchards were not near so great a failure as this season. Then apricots went up to 18 cents. With the present barrenness of the market and the shortness of the crop, there is no reason why the price should not be still higher. There is no cheaper fruit that can be used as a substitute to keep down the price. In the East the apple crop, which has always been the most successful competitor with our dried fruit, is a most complete failure, and will not be recognized as an antagonist this season. It is likely that a very much larger proportion of the peach crop than usual will be absorbed by the canners, as has been the case with the apricots. It is also certain that the shipments of green peaches will be very largely in excess of those of last year. Thus, the end of the peach harvest is likely to find us with little or none of the crop dried. Prunes are, in fact, not half a crop, and the price will be in proportion. Everything indicates that none but the rich can eat dried fruit this year, and that even they will not be able to get all they want, no matter how high they bid."

From Hanford, in Tulare County, comes a report of the satisfactory crops of apricots in Lucerne, and this statement: "Every man with an orchard of this fruit feels his bank account growing." In the Lucerne section the apricot crop this year has been about three times as large as in 1891, and there has been a good deal of competition among apricot buyers, resulting in an average price to producers of about 9½ cents per pound. From Pasadena, Los Angeles County, comes also the news that this year's apricot crop is thought to be the largest ever known in that valley. Says the Pasadena "Blade:" "A ride through the apricot orchards reveals an interesting sight. Broken branches everywhere betray the fact that the trees are overloaded. Pickers are everywhere at work, and here and there are gangs of girls and boys engaged in pitting fruit for progressive ranchers, who prepare their own product for market. One man, living between this city and Tustin, has 300 tons of apricots on 25 acres. This is a yield of nearly $200 per acre."

This allowing apricot trees to overbear, however, is not considered wise by some of the more northern successful raisers of this fruit. One of the orchardists of Vacaville recently stated that the Southern Californians hate to pull green fruit from their trees. Perhaps this is so. But at least the most successful orchardists around St. Helena, San José, and Vacaville think it wise to thin out their fruit, and so by preventing the apricot trees from overbearing, obtain steady returns every year. This practice is the result of years of raising fruit, and while it may seem alarming to think of tons of green fruit being thrown away in Central California, yet the apricot grower has method in such madness.

A correspondent of the Pomona "Progress," a short time ago, endeavoring to inform Southern Californians of the apricot custom of Central California, said: "In the great Spencer orchard of 135 acres at St. Helena, I saw seventy men at work thinning the fruit. I saw fully twenty tons of young green apricots that had been pulled from the trees, and was told that as much more of the green fruit would be taken from the branches. I saw a small army of men and boys in the hundreds of orchards about Vacaville, all pulling green apricots and peaches from the trees, and there were big piles of the young fruit in every orchard. In San José I saw literally hundreds and hundreds of green apricots and peaches lying under the trees, where they had been thrown by the men who were employed to thin the crops."

All this is done because the orchardist thinks it better to have large, plump apricots than a greater quantity of small fruit.

Apricots are really a California possession. No other State in the Union can claim to have so good, constant returns from this fruit. In 1889 Southern California received $280,000 for its apricot crop. The fruit does well in many of our counties, especially in those along the coast. Some of the extreme northern and eastern sections of the State are shut out from reliable crops on account of the high altitude allowing late frosts to attack the apricot. Last year the Fresno "Republican" said that there had always been a question among the fruit growers of that county as to whether the soil and climate were exactly adapted to the successful growth of the apricot. For several years the Fresno County apricots had not been of such a quality as to warrant shipping them in quantities to the East.

The Royal and Moorpark apricots are looked upon with a good deal of favor by growers here. Last year the Agricultural Experiment Station of the University of California analyzed a wonderfully sweet variety of small, early apricots received from Tulare, the juice being found on analysis by the copper (inversion) test to contain 13¼ per cent of sugar. The apricot was thought to perhaps be the "Pringle" variety, and the report of the station said that the result, 13¼ per cent, was the highest but one—16.5 per cent—that the analyzers could find on record for apricots, the usual average being about 4.69 per cent in the whole fruit of European varieties. This figure, 4.69 per cent, however, did not refer to fruit grown in California, and the analyzers at the University Station did not yet know what is the usual percentage of sugars in the California standard canning and drying varieties of apricots.

It has been suggested that apricot growers who have collections including a number of varieties, take notice as to how different varieties are affected by the shot-hole fungus, and report in due time which varieties are the most injured, and which, if any, are little affected. We are led to make this suggestion by an item in a South Australian paper, which describes how Mr. Westerman Smith advances the proposition that instead of trying to combat the shot-hole fungus of apricots, it would be better to grow varieties that are nearly free from attack, such as Oullin's Early Peach and Princess Orange. The first he had grown for five years and the latter seven years, and nearly free from disease, which has been present in the orchard three years. Over 85 per cent of clean fruit was yielded by the two varieties, without any cost for fungicides. Of the twenty sorts of apricots cultivated, only two or three were of any value.

One of the varieties named by the Australian observer is hardly known in this State, and the other is not on record at all. But if they resist, there are probably others known to our readers which are also resistant. Our observation is that there is considerable difference in the severity of the attack, both with apricot and plum varieties, but we have not looked into the matter as closely as we shall in the future. We trust others will do the same, and see if a test can be made of varieties satisfactory in season, size, and bearing, which do not yield to the shot-hole. It would be a consummation greatly to be desired.

THE CHERRY.

The cherry crop of 1892 was from one half to two thirds of the average yield. The sap was chilled by the late rains and cold weather, and the fruit did not ripen so uniformly as usual. Alameda County, from the northern boundary line to Niles, is the great cherry section of the State, and through all this region not over half a crop was reported. Following close upon Alameda, as a cherry producer, comes Santa Clara County, and then, in order, Solano, Napa, Placer, Sonoma, Santa Cruz, and Sacramento. Very few cherries are grown in the San Joaquin Valley counties, and for many years it was accepted as an undeniable fact that it would not flourish in the southern counties; but experiments made in this section of late upset that idea, and leave it possible that with a careful selection of varieties adapted to the climate, with suitable soil and careful attention, the cherry may be made successful. At Ontario, 100 cherry trees at the upper end of Euclid Avenue produced this year 2,838 pounds of fruit, which sold at 10 cents per pound, realizing $283 80. It is stated that the trees had not been irrigated for two years, and had only one cultivation within the past year.

J. E. Lanterman, of La Cañada, in Los Angeles County, sent to the Los Angeles Chamber of Commerce clusters of as fine cherries as were sent from the north, with the statement that he had an acre and a half of trees that were loaded, from two of which he had picked 200 pounds, and so heavily were they loaded that it was hard to tell that any were taken from them.

Mr. James Birch, of the upper Yucaipe Valley, in San Bernardino County, has a little less than three fourths of an acre in bearing, and the yield this year was 6,000 pounds, the entire crop being sold in the local market at 10 cents a pound. The yield last year was 6,260 pounds. The varieties are Black Tartarian, Lady of the Lake, the Great Bigarreau, and Napoleon Bigarreau.

Writing of the cherry in Southern California, A. H. Judson says:

"The bearing cherry trees, growing at an altitude of about 5,000 feet, are on a small plot of ground not more than an acre in extent, surrounded by hills. The ground is naturally rather moist, and contains two or three springs, and the location is quite frosty.

"Two varieties of cherry are growing there, one a black and the other a whitish-yellow cherry, slightly shaded with red. Not being an expert in cherry growing, I cannot vouch for the true names of these cherries, but have supposed one to be the Black Tartarian and the other the Yellow Spanish.

"These trees must have been planted fifteen or twenty years ago, judging from their size, and for many years have had no care whatever. Cattle and horses graze about them and rub up against them, and gophers and squirrels have full sweep to the roots, and have ruined some of the trees. Notwithstanding all this neglect, there are fifteen or twenty trees still growing, which blossom full every year and bear heavily, except when nipped by frost.

"That the cherry is a success in that particular spot admits of no reasonable doubt. Whether it will prove as much of a success on my 'Highland Home' property, 2,000 feet below, is another question.

"My trees there, on disintegrated granite soil, have been planted between four and five years, and bore some very fine fruit. I have much confidence in the ultimate results of my efforts to grow cherries in that place, but I suppose it will require at least four or five years more to give the matter anything like a fair test."

THE FIG.

Very great interest is being taken in fig growing and packing, especially in the southern part of the State, where large bodies of new land have been set to this fruit in the past few years. While the fig as yet does not hold a place of commercial importance in our State, it promises in a few years to take a prominent position among our fruit exports. Numerous experiments in growing and curing are being made in different parts of the State by individuals, and some of these give marked promise of success. In aid of this industry this department has distributed a large number of cuttings of the genuine Smyrna fig, and later a number of rooted trees. These were procured direct from Smyrna, and no question of their genuineness can be raised. These have been distributed to different sections of the State, and while as yet too young to give any returns, reports from them so far as received are very encouraging.

At the California Experiment Stations much and careful study has been paid to this branch of horticulture, and a bulletin was issued early in the present year setting forth the results of their experiments. It contains much valuable information for the use of the fig grower, and is on that account given below:

"The fig promises to become one of the most important fruit trees of California. But the culture of this fruit belongs chiefly to the borders of the Mediterranean, especially Asia Minor, and much less is known here about varieties and their treatment than is the case with the more common deciduous fruits. The numerous discussions upon the fig, in recent years, prove the existence of a strong and growing interest in the subject. It was therefore decided to stock the stations with every distinct variety of fig, and to observe the growth, hardiness, quality of fruit, and other elements of importance.

"There are about fifty varieties growing at the various stations, and some additional sorts are still in nursery rows. The smallest stock is at Pomona, but it will be increased this coming season to an equality with the stations earlier established. The following list shows the varieties now growing and studied in the preparation of this report:

Agen.
Angelique.
Abondance Précoce.
Brianzola.
Black Ischia.
Brunswick.
Black Bourjassotte.
Black Marseilles.
Barnasotte Gris.
Brown Ischia.
Brown Turkey.
Black Brogiatto.
White Brogiatto.
California Black.
Col di Signora Nero.
Drap d'Or.
Dalmatian.
Dorée Narbus.
De Constantine.
Du Roi.
White Dottato.
Black Dottato.
Early Violet.
Guigliono.

Grossale.
Gros Gris Bifere.
Grizzly Bourjassotte.
Hirtu du Japon.
Ladora.
Monaca Bianca.
Negra Larga.
Osborne Prolific.
Pasteliere.
Royal Vineyard.
Ronde Noire.
Ronde Violette Hâtive.
Raby Castle.
Rocardi.
Rubrado.
Smyrna No. 1.
Smyrna No. 2.
Smyrna No. 3.
Smyrna, Wild.
San Pedro.
Sanvito.
Trojano.
White Bourjassotte.
White Genoa.
White Adriatic.
White Marseilles.

"The first season after the figs were planted at the different stations, many differences in growth and in adaptation to climate began to be noticed. The varieties showed a greater range of variation in respect to their power to resist cold than any other semi-tropic fruit. The problem that naturally presented itself was this: How do the various sorts compare in point of hardiness and relative endurance? The colder districts of the State desire to grow figs, if possible, and need the varieties that are most hardy. Then, also, we may expect to produce still more hardy seedlings from hybrids of certain sorts, or by fertilizing the finer table figs with the wild Smyrna. In a few more years, when all the varieties being grown are in bearing, the comparative value of the fruits can be tested. At present the problem of hardiness requires attention.

"On December 17th and 18th I examined the growth of the fig trees at the San Joaquin Valley Station at Tulare. Forty-two varieties are now represented there, to which the wild or Capri fig, and several new sorts imported last year, will be added. The fig trees are planted in avenue form, and in the present unsheltered condition of the station it cannot be said that there is any difference in temperature between different portions of the avenue. In the course of time, when the orchard is fully developed, the avenue will be less exposed to the wind. But the Tulare region is subject to as great a range of temperature as any other part of the San Joaquin Valley. There seems to be a basin about the lake into which the cold air settles, and it is doubtful whether rows of forest trees will be of as much service here as in some other localities where the cold is due to air currents that may be broken.

"The fig trees at this station were mostly planted in the winter of 1888–89. Some died, having been set in alkali spots, and were replaced. The worst situations have now been treated with gypsum, about 10 pounds having been put around each tree. Owing to the differences of soil, a very great difference in the growth of trees of the same age is manifest. This, of course, is complicated with the difference naturally belonging to the growth of different varieties. About twelve of the varieties of figs represented bore fruit last season (1891). Du Roi, a new variety little known in the State, was one of the best of these, and attracted much attention.

"All the fig trees received some irrigation, but not a drop of water was allowed them after August. The first heavy frosts in November took off all the leaves. The wood appeared well ripened in most cases, except, as usual, the extreme tips of 'water sprouts' and late growths. It was therefore a surprise to the foreman when some of the trees showed the effects of the early December frosts (temperature, 22°). Certain varieties appear to suffer, and it does not seem to be a question of alkali or cold currents; for, as previously stated, the whole tract is subject to identical conditions in this regard. Besides, trees of the same kind, one of which stands on sandy soil and the other on alkali, seem to suffer to a similar extent.

"Of the older varieties (older in point of introduction to this State) the California Black is not to be ranked as high in the matter of hardiness as was to be expected. It can only be called 'medium;' the White Ischia stands somewhat better; the Dalmatian does fairly well; the Black and White Marseilles, which, unfortunately, are rather small for table use or for drying, do even better than the Dalmatian. The San Pedro, a fine table variety much liked by growers, suffers greatly, even branches of half an inch thickness being frozen. The two Smyrna varieties have stood the frost well. The Brown Ischia has suffered more than the Black California. The three Bourjassottes, black, white, and green, together with the White Adriatic, are able to withstand the cold.

"Among the new varieties, the Du Roi, previously alluded to, is one of the most hardy. Ladora, an excellent fig, is badly frosted, but not enough to justify discarding it as yet. Col di Signora Nero is so much frozen that it must be cut back nearly to the ground next spring. One of the worst cases in the avenue is that of the Gros Gris Bifere, which is certainly not hardy enough for the station. Ronde Violette Hâtive is a fine fig, but slightly frosted, and probably safe when older. De Constantine and Drap d'Or have done well. Abondance Précoce suffers a little; Royal Vineyard ranks but medium. The most hardy fig at the station, and the only one that shows no sign of frost anywhere, is the Dorée Narbus, one of the new importations. There are two trees of this variety in different parts of the grounds, one in alkali, the other (near the orange trees) in sandy soil. It has compact growth, hard, dark bark, short joints, and small buds. The leaves are dark and rather small. It has not yet fruited, but if it proves to bear well and to be of fine quality, it can be recommended for frosty situations.

"To sum up these observations, there are two or three sorts being tested that seem unlikely to stand the climate. Possibly ten sorts show appreciable loss of young wood. All the others, except the Dorée Narbus, show some slight effect of frost upon the soft, late growth, but not, except as above noted, enough to affect their orchard value to the region.

"The fig experiment at the Southern California Station, near Pomona, is less advanced than any other, since trees were only planted there last spring. It was hoped that all the varieties would prove hardy to Pomona, and at first it appeared that they would do so. But this month (January) many varieties have suffered from frost. The complete comparison with Tulare and Paso Robles cannot yet be made, for the list of varieties is incomplete at Pomona. But the following sorts proved hardy: Du Roi, Monaca Bianca, Hirtu du Japon, Agen, and Col di Signora Nero. This shows that more varieties out of the complete list of fifty-one will thrive at Pomona than at Tulare or Paso Robles. Twelve varieties, mostly new, and very small trees with immature wood sent to the station for growth for a year in nursery rows, were severely frozen, in some cases 'nearly to the ground.' This, however, is not evidence against future success with many of these varieties. The following trees suffered much from frost, and are probably unreliable in this part of the valley: Gros Gris Bifere, Grizzly Bourjassotte, Ronde Violette Hâtive, and Negra Larga.

"At the Southern Coast Range Station, near Paso Robles, where the same varieties of figs are growing, the problem is further complicated by the fact that there is much difference in the soil and location of the trees, the avenue passing through a low swale that is much more frosty and has a more compact soil than the rest of the tract. Most of the trees were planted at the same time as those at the Tulare station. They received no irrigation. Those in the most exposed positions were wrapped in straw to protect them. January 4th the straw was taken off so as to make a thorough examination, and put back again.

"Among the figs on the high land were the Black and the White Bourjassotte, the two varieties of Smyrna, Ronde Noir, Brunswick, Col di Signora Nero, Angelique, White Ischia, Agen, and Pasteliere. All did fairly well except the White Ischia, which was badly frosted. At Tulare, also, the White Ischia was more tender than the Bourjassottes. The only marked difference between the two stations in this group was in the case of Col di Signora Nero, which nearly escaped frost at Paso Robles, but was very badly frosted at Tulare.

"Continuing along the avenue toward the swale, under less favorable conditions the White Adriatic, as at Tulare, proved fairly hardy, and grew well. A small tree planted in 1890–91 suffered somewhat. The Dalmatian was only a little touched with frost. Drap d'Or, on quite low ground, suffered much. De Constantine, as at Tulare, made a strong growth, and nearly escaped frost. A Smyrna, planted in the swale in 1890, gave an opportunity for comparison; it was considerably frosted, but not nearly as much as some other varieties. The Black Marseilles, which did well at Tulare, was 'cut right down' to the ground with the cold. California Black, as at Tulare, was not in the front rank, only 'of medium hardiness.' Brown Ischia, as at Tulare, must be placed below the Black Californian. Early Violet, which did fairly well at Tulare, was severely frosted here. Dorée Narbus, the most hardy of all at Tulare, 'withstood the frost,' though in one of the lowest and most exposed situations, but 'has grown little.' Hirtu du Japon was also hardy. Gros Gris Bifere, which was one of the most badly frosted sorts at Tulare, was also very severely frosted here. So was the San Pedro and the Monaca Bianca. The last three were on adobe soil.

"The foreman, Mr. R. D. Cruickshank, writes as regards the general subject that 'some varieties are on adobe, some in the swale, and some on the higher and drier lands,' as before stated. He adds: 'The kind of soil they occupy has much to do with the maturity of the shoots in autumn, and their ability to withstand the frost. I notice that those on the high ground have always suffered least, while none of them have been very severely frosted this year.' The thermometer went down to 18° one night this season, and to 20° on another. The figs have been touched regularly with frost every spring and fall since they have been planted, and on the whole have not done very well: 'They do not occupy a very good piece of land, and at first had a hard struggle with the gophers.' For this reason it has been decided to remove from the swale those varieties that do not withstand the frost there, and plant them on higher land.

"The result of the experiment can be summed up in a few words: The fig is not an entire success in this region, unless the location is carefully chosen. It must be high and protected from severe frosts. When the swale on the station tract is more fully underdrained, figs will do better there, but it is not the place one would choose for a fig orchard.

A tract 200 or 300 feet higher would give better results. For family planting it would seem that the Smyrna, White Adriatic, Dorée Narbus, and several others to which allusion has been made, are here among the more hardy sorts.

"At the Sierra Foothill Station, near Jackson, Amador County, the figs are planted so as to encircle a hill. Some of them are only 25 feet above the lowest point on the grounds—the bank of the mining ditch; others are nearly at the top of the hill. They occupy several classes of soil—the red (slate) and the granitic, but few are on the pure granite soil. The foreman, Mr. George Hansen, writes that the leakage of the large reservoir on the top of the hill might have reached a few of the figs, but that the finest trees are entirely out of its reach, and none received any intentional irrigation. We have here a fine practical illustration of the suitability of fig culture to the rocky foothills of similar regions.

"It is worthy of note, further, that the olives occupy the warmest part of the reservoir hill. The lowest temperature on record at the ditch is 20° F. Twenty-five feet is a small elevation, but it is likely that it makes a difference of several degrees in such a locality. When a few trees are planted on the newly cleared land beside the ditch, for the purposes of comparison, the list of hardy varieties may be lessened. At present, as the foreman writes, there is not a single variety that shows signs of having suffered from frost this season. Some trees mature late, and the wood is still green, but sound. Two kinds, Du Roi and Brown Ischia, both at the top of the hill, kept their leaves later than others, so the leaves were frozen, but that did not affect the wood. Practically, none of the fifty-one varieties of fig at the station can be called other than hardy, as now planted, above the valley.

"One point worth comparison with the other stations is that of growth. Dorée Narbus, noted as being especially hardy elsewhere, but as of slow and poor growth, is 'gigantic' at the Foothill Station. Other superb growers are Brown Ischia, De Constantine, Monaca Bianca, and White Adriatic. The following sorts can be called first-class growers, though not equal to the first named: White Genoa, Du Roi, Early Violet, Col di Signora Bianca, Bourjassotte Grise, White Ischia, White and Black Marseilles."

THE OLIVE.

This is another fruit to which great attention has lately been paid, and with good success in our State, and to the growth of which very large areas of land in the State have been devoted. The olive has been grown in California from the date of its earliest settlement by the Mission fathers, and one of our standard varieties is known as the Mission. The tree does well over the greater part of the State, and will flourish in places where other trees could hardly establish a foothold. It repays care and attention, however, as well as any orchard tree we have. The cultivation of the olive and the manufacture of its oil became of such importance that it was deemed advisable to organize the growers into an association for the advancement and protection of this great industry, and on July 8, 1891, a meeting was held in the rooms of the State Board of Horticulture, and an organization effected. An association label was adopted for their oils, and Justinian Caire, of San Francisco, was appointed agent of the association. A Board of officers for the year was elected, and the membership was divided into two classes: active members, being those actually engaged in the commercial production of oil, and honorary members, being those engaged in olive growing, but who have not packed oil for the market. So soon as an honorary member becomes a producer of oil for the market he is entitled to full or active membership.

The second annual convention of olive growers was held at the rooms of the State Board of Horticulture on July 21, 1892, and the following-named gentlemen were elected officers of the association for the ensuing year:

Ellwood Cooper, Santa Barbara, President; Frank A. Kimball, National City, Vice-President; Justinian Caire, San Francisco, Treasurer; B. M. Lelong, San Francisco, Secretary. Directors: Ellwood Cooper, Santa Barbara; John Bidwell, Chico; Frank A. Kimball, National City; E. E. Goodrich, Santa Clara, and John C. Gray, Oroville. Reports of progress were made and a number of interesting papers were read.

President Cooper, in his opening address, touched on the difficulties experienced in the introduction of pure oils, and the necessity for legislation to guard the purity of food substances. He said:

"The Olive Oil Act, as passed by the Legislature, has been in a great measure inoperative. The adulterated olive oils, or the sophistications that were exposed for sale, were simply relabeled, substituting the words 'salad oil' for olive oil. These labels were placed over the former labels, and the oil sold as salad oil, at the same price and under the same false statements by the dealers as before; and so long as consumers are not aware of the dangerous admixtures imposed upon them by false representations, or that sufficient legislation cannot be had controlling absolutely the character of food products, so long will this law be violated; it is incumbent upon us to promulgate such information as must deter all intelligent people from being deceived by adulterated compounds.

"The Act to regulate the practice of pharmacy, as approved March 11, 1891, has not met with any better success, for the reason of a serious defect in the condition of its enforcement.

"The Commissioners appointed by the Governor to carry out the intent of this important Act had several meetings, and were organized and ready to perform the duties imposed upon them; but the following clause practically made it a dead letter (page 86, Statutes of 1891):

> SEC. 9. On written complaint being entered against any person or persons charging them with specific violation of any of the provisions of this Act.

"Any one familiar with modern litigation will be very slow to make a complaint.

"I conceived the idea of introducing pure olive oil into all the drug stores throughout the State, and engaged a druggist familiar with the trade to travel from place to place to sell my oil. He was met with open disregard of the law, and the statement that they would not comply until they were forced to do so. In other words, they intended to go on compounding prescriptions with adulterated articles, regardless of the result upon the unfortunate individual who took them. In other matters of far less import the law deals differently; for example, take our banking laws. Persons organizing a bank to do business have to take the oath that they will comply with the Banking Act, under which they organize. A bank examiner, duly authorized, with competent knowledge and expert training, has the power to enter any bank at any time, without notice, and examine all the securities and affairs of the bank, and in the event of discovery of non-conformity with the written law, or insecure transactions, can close the doors and compel liquidation. Does anybody complain of this? Does it interfere in any way with public business?

"I propose that we appoint a committee to look after legislation at the coming session, and that we endeavor to have the Pharmacy Act so amended as to strike out that part of Section 9 that I have read, and insert that a certain number of drug inspectors shall be appointed, with a sufficient salary and traveling expenses, sworn to do their duty, and clothed with all the power of a bank examiner.

"To amend the olive law by including all food products.

"That every food product exposed for sale shall contain on the label (1) the name of the manufacturer or compounder, with the place of manufacturing or compounding; (2) the name and actual percentages of the different ingredients composing the article, and (3) the actual quantity, if liquids, contained in the package, and if solids, the actual weight.

"Does anybody presume that such laws would be unjust, or interfere with honorable trade relations?

"The expense involved in maintaining the inspectors would not be the one hundredth part of the amount that is now swindled out of the consumers by the infamous practice of adulteration. It is due the wageworkers who are engaged all their time in the struggle for existence, and who may not have the knowledge or the time to inspect the deleterious articles that are dealt out to their families at every store at which they deal. It is due all classes that they should be protected from noxious or poisonous mixtures. It is the duty of every intelligent being to throw all his power in the line of arresting this most monstrous evil.

"Inspection laws controlling staple products have been in force ever since the foundation of our Government; to enlarge or extend such regulations is compatible with the spirit of our republic, and no abridgment of our liberties to do right. To do wrong, yes, we have special laws to control counterfeiting, to control forgery, and most rigid sanitary laws to prevent the spread of dangerous diseases. Adulteration of food products is counterfeiting and forgery, and aids the spread of epidemics. By adulteration a man is made sick, and by it he is prevented from recovering.

"The Pure Food bill now pending before Congress, and which will probably become a law of the land, will aid us in enforcing in our State the most stringent measures against adulteration. All imported food products, and all such articles brought from sister States, will be, or can be, controlled by the provisions of said Act."

THE PEACH.

The peach has always been a favorite fruit in California, and a profitable one. In our foothill and valley regions it attains its perfection, and is subject to fewer drawbacks than in most parts of the Union. Very large areas of peach land in the Eastern States have been devastated by the ravages of the yellows and rosette. As soon as it was known that there was danger of these diseases being introduced into our State, stringent quarantine measures were introduced and enforced, and as a result, neither of these dread diseases, which have ruined such large sections of the older peach countries of the East, have obtained a footing in our own State.

Faith in the peach as a paying crop is still holding its place with our orchardists, and this is evidenced by the fact that there are now 55,000 acres in this fruit in the State, of which over 21,000 acres are new plant, not yet in bearing.

The large demand for peaches for table use, drying, and canning, and the high prices received for them, amply justify their cultivation in large quantities. The demand is a steady increasing one, and as the peach area of the East becomes more circumscribed, the demand for California peaches will become greater. The heaviest planting of peaches this season has been in the counties of Santa Clara, Solano, Tehama, Tulare, Los Angeles, Placer, and Kern. In the last named county a great deal of attention has been given the peach in the past few years, and the results have been highly gratifying.

The peach crop of 1892 throughout the State has been light, averaging about two thirds of the usual output. This was occasioned by late rains and severe cold weather which came when the trees were in bloom. In some sections the crop was a total failure. These, however, were few. In many portions half a crop was reported, and in others it was very heavy. The shortage was heaviest in the northern and northeastern counties, decreasing toward the southern end of the State. In sections where the shortage was but partial the extra size of the fruit went far toward making up the loss, while the strong advance in prices which took place soon after the fruit began to ripen amply compensated the grower for his shortage.

This year has produced several seedlings which seem likely to extend the peach season in the line of fine yellow varieties. At a meeting of the State Horticultural Society, Fred. C. Miles, of Penryn, exhibited two notable seedling peaches. One was a very large yellow cling, rich and handsome, ripening 10 days later than Salway. Another of about the same date of ripening was a very large, beautiful, yellow freestone. Both are seedlings of Mr. Barton, whose name they will bear. Their great size, late ripening, and excellent shipping qualities bid fair to make them notable in the future.

A fine yellow freestone, which seems to be a few days later than these, has been brought to light by C. W. Albright, of Placerville. It is not so large as the Barton, nor quite such a brilliant yellow color. It is, however, of good size, with rich, yellow flesh of high and true flavor. The samples were picked October 5th, stood shipment to San Francisco perfectly, and have remained several days since receipt in perfect condition. The variety promises to have a future if its bearing qualities are satisfactory.

R. W. Bell, of the Santa Rosa nurseries, produced a peach which he names the Wonderful, fruit from which was picked as late as September 26th. It is a medium-sized, yellow freestone, rather oval, keeps well, and is satisfactory in interior qualities.

W. T. Kirkman, nurseryman at Atwater, Merced County, also has a good, yellow freestone, ripening last of September, which has originated in his neighborhood. It is a very symmetrical, handsome fruit of good quality. Though of good, medium size it should be larger to compare well with the other seedlings of the same or later season mentioned above. It is certainly worth attention, and may prove very valuable locally, at least.

THE PEAR.

The season's pear crop is reported as very nearly up to the average. In some few localities there was a shortage, but this was not nearly so heavy as in the case of stone fruits. The pear is one of the standard fruits of our State, and the Bartlett has given us a reputation for pear growing. Owing to the peculiarity of the pear in ripening best off the tree, and its consequent availability for shipping over long distances, it was the first fruit exported from California, and served as the pioneer for the gigantic trade which has since sprung up in California fruits. Unlike many of our fruits, there has been no boom in pear growing, but a steady and continuous growth has characterized it from the settlement of our State. It was one of the fruits introduced by the Mission Fathers, and trees of their planting may still be found in the State.

Naturally, when Americans began to plant in the early fifties, they also planted pears, securing the best sorts obtainable, and from that time to the present the pear has received a fair share of encouragement.

There are now nearly 23,000 acres in pears in the State, of which 8,236 are not yet in bearing. It is a hardy grower, will do on almost any kind of soil, but prefers a heavy alluvium, moist, but well drained. Its returns are almost certain, and there is always a good market for the crop. A very material advance in the price of pears this season promises to give a great impetus to this branch of horticulture, and a large amount of new land will be set to pears the coming season.

The Bartlett is *the* pear of California. Sweet, juicy, delicious, handsome, even when grown in New York or other favorable Eastern locations; all these qualities are increased in California, where the size and amount of sugar developed in this fruit is phenomenal.

Being a summer pear it must be picked for Eastern shipment before it has attained its full size or received its full amount of sugar; so that to enjoy a California Bartlett pear in its highest perfection one must eat it in its native orchard. Possibly the fine refrigerator car service of to-day may make it possible to pick them here in full perfection and get them through when just right.

The canneries in California buy and use immense quantities of this fruit, and it is one of the choicest of the canned products of the State. The greatest care is used in preparing it for the cans. The operator in halving it is careful to exactly bisect the portion of the stem within the neck of the fruit, and this secures a firmness to this portion which keeps the pieces unbroken even when thoroughly cooked. If people who talk about the carelessness of canneries could only see how careful the young lady operator is with her fruit, which is placed under water at once when prepared, so there may be no discoloration; if they could only see how carefully it is packed into the cans and covered with clear syrup, and how carefully the cooker watches the clock while the great tray of cans is in the great bubbling tank of steam-heated water, they would more highly appreciate the choice fruit when it is opened on their table.

Allowed to become fully ripe and then dried with just sufficient sulphuring to prevent discoloration and decay, the Bartlett pear becomes a delicate confection.

There are many other kinds of pears which come to great perfection in California. We shall not attempt to enumerate them, for each has some special good quality to recommend it, but will mention some of the standard sorts that prove very profitable for growth and shipment.

After the Bartlett comes the Clairgeau, which has become quite a favorite with both shippers and growers, and there are quite a number of fall pears that are really good. The Duchess and Easter Beurré grow large and fine for late shipments. The Winter Nelis is a fine winter pear, not large, but of fine quality. In most locations it is getting out of repute with the growers, because of its capriciousness in bearing. Its flowers seem to blast easily. Perhaps with a more thorough use of fungicide remedies this tendency could be overcome. We have never seen pear trees more heavily loaded than the Winter Nelis in some sections of the Sierra foothills. An early winter pear is the Seckel, about the smallest of the commercial pears, but so spicy and delicious that it is a favorite everywhere. We have found this doing finely in the mountains, and bearing enormous crops.

California has originated several noted pears. B. S. Fox, an early nurseryman of San José, raised several new varieties, which have attained a great reputation as "Fox" pears. Of these the P. Barry is perhaps the most celebrated. It is a long, slim pear, of symmetrical shape, and one of the best keepers known. The flesh is free from the granular texture possessed by some pears, and when ripe is smooth, sweet, and buttery. By putting these pears in a cool place they will keep till late in the spring, and their ripening can be hastened by placing in a warm, dark place.

Mr. A. Block, of Santa Clara, has originated and tested many new sorts, being a constant and patient experimenter in that direction, and unless he secures something equal, or superior, to well-known sorts, the world never knows it. He has two varieties—the Acme and Superbe—which have attracted great attention, and when shipped with other sorts have brought largely increased prices.

Almost every neighborhood has a superior pear of local origin. Some of these prove valuable when introduced elsewhere, and others are never known beyond their immediate section. The Idaho is one of these local productions, named from the State from whence it came. It has been extensively introduced, and the verdict will be given after a few years.

The pear is found all over California, and there are here and there locations which claim especial adaptability. Santa Clara was the location of one of the earliest and best of the "Mission" pear orchards, and the portion of Santa Clara Valley about that place has been one of the most noted pear-producing sections of the State.

In some orchards we find trees of the celebrated Pond pear, specimens of which have astonished the world, and won for California a part of her reputation for "big" things. We have seen many specimens weighing 3 pounds, and one or two weighing 4 pounds each. They are a winter pear, and color very handsomely. We have no doubt they will excite great wonder at Chicago next year.

Another great pear region, especially for the Bartlett, Winter Nelis, and Seckel, is in the foothills of the Sierra, at an elevation of 2,600 or 2,700 feet. These varieties of pears we have found to be of more uniformly good quality and size, and to bear better crops, than in any other portion of California we have seen.

The mountains of the Coast Range promise well for pears. They will endure a warmer climate than apples, but the temperate climate of the coast valleys, and the slopes of the mountains at quite an elevation seem to be best suited to them.

The area of successful culture is more widespread than one could suppose, and is, we believe, larger than in the case of any other fruit in the State.

The use of the pear can be considerably increased by drying the ripe Bartletts, and by encouraging more fruit dealers to prepare for and receive the California pear in autumn just before cold weather comes, and properly ripen it for their winter trade as they may need. To do this the Eastern dealer should have cold storage facilities, or a cool cellar will do fairly well, and then a warm, dark room in which to ripen as needed. There is much in ripening pears. Nearly all kinds, if allowed to ripen on the tree, are spoiled.

THE PRUNE.

The large yield, ease of growing, and good returns from prune orchards have given an impetus to this branch of fruit growing in the past few years that is almost phenomenal. The prune industry may be said to be the growth of the past decade, for while a small shipment of prunes was made from San José by J. Q. A. Ballou as early as 1867, it was not until ten years after that it had grown into notice, and not until several years after this that it became of commercial importance. In the past ten years, however, prune growing has made wonderful strides, and there are now nearly 50,000 acres in prunes in this State, of which less than one half are in bearing, and not over one fourth in full bearing.

The total output of the State for the year 1891 was 27,500,000 pounds. This was the largest yield for any one year. Early in the spring of 1892 the indications were favorable for a very large crop, and it was confidently expected that the output would run from 40,000,000 to 50,000,000 pounds, but, like all other classes of fruit, the prune was severely injured by the late rains and cold weather, and it is not probable that the present season's crop will exceed 18,000,000 to 20,000,000 pounds.

Prices opened well early in the season, 10 cents being paid for sixties to nineties, sacked and delivered on the cars. A number of orders were placed at that price, when a decline to 9 and 9¼ cents took place. This price remained for about ten days, when it again advanced to 10 cents and remained stationary.

The following figures represent the prune crop of this State for a period of five years:

	Pounds.
1887—Cured prunes	5,825,000
1888—Cured prunes	8,050,000
1889—Cured prunes	17,000,000
1890—Cured prunes	16,000,000
1891—Cured prunes	27,500,000
Total for five years	74,375,000

During the same period there were imported into the United States, from Europe, 276,243,746 pounds, as follows:

	Pounds.
1887—Prunes, all kinds	92,032,625
1888—Prunes, all kinds	70,626,027
1889—Prunes, all kinds	46,154,825
1890—Prunes, all kinds	58,093,410
1891—Prunes, all kinds	9,336,859
Total imports for five years	276,243,746

This gives a total consumption of prunes in the United States of 350,618,746 pounds in five years, or an average of 70,123,749 pounds per year.

There are now 49,630 acres set to prunes in this State, of which 25,332 acres are in bearing, and 24,298 have not yet come into bearing. Of those bearing, not over 50 per cent have reached the full bearing age. Of the new plant, a very large percentage was set out in 1891, the plant of 1892 being much less, owing, probably, to the low prices which prevailed for fruit last season, and a growing impression that there was danger of overdoing the prune business.

The principal planting of the past two seasons has been in Santa Clara, Tulare, San Bernardino, and San Luis Obispo.

RAISINS.

The raisin industry has made more rapid strides during the last ten years than has any other branch of horticulture, advancing from a pack of 120,000 pounds in 1873, to 52,831,800 pounds in 1891. The ratio of increase has been most rapid in the past five years, as will be seen from the following table of shipments during the periods mentioned:

	Boxes.	Pounds.
1873	6,000	120,000
1874	9,000	180,000
1875	11,000	222,000
1876	19,000	380,000
1877	32,000	640,000
1878	48,000	960,000
1879	65,000	1,300,000
1880	75,000	1,500,000
1881	90,000	1,800,000
1882	115,000	2,300,000
1883	125,000	2,500,000
1884	175,000	3,500,000
1885	475,000	9,500,000
1886	703,000	14,060.000
1887	800,000	16,000,000
1888	1,250,000	20,500,000
1889	1,633,900	32,678,000
1890	2,341,463	46,829,260
1891	2,641,590	52,831,800

The very large profits made in raisin growing drew large numbers into the business, and for a time it looked as though the market was in danger of being overstocked. A warning pamphlet issued by George West, of the State Board of Viticulture, and the very low prices which ruled for this fruit last year, had a salutary effect, and checked excessive planting. As a result the new acreage set to raisins during the present year has been comparatively small.

The present season's crop is far below average, and while there are no authentic returns yet in, it is estimated that it will not exceed two thirds of a crop, and may fall to one half. June reports from the Weather Bureau at Fresno, stated that 75 per cent of the three-year old vineyards in the Fresno district lost all of their first crop, and the remaining 25 per cent would produce only a quarter of the expected yield. In the four-year old (and over) vineyards the loss was from 25 to 60 per cent. It was computed that the total crop of London layers would be 50 per cent short of last year's. Vineyards that have dropped their first crop will have a fair second crop, but it will be late.

These predictions were but partly fulfilled, as the first crop turned out better than was expected, while the second crop was exceptionally good. The result was that while the crop was much lighter than average, it was much better than was at first expected.

Prices were very much better than last year and the demand greater. This was brought about largely by a combination among the raisin growers to maintain prices for their fruit. A meeting for this purpose was held in Fresno on June 22d, at which the following agreement was formulated and generally signed:

"We, the undersigned, raisin growers of California, having become fully satisfied that the present demoralized condition of the raisin market is almost, if not entirely, due to the absence of any understanding concerning uniform selling prices among the parties who have the products of raisin vineyards in their hands for sale, and from the fact that numerous established agencies in the East are in the habit of competing, and thereby underselling each other, without regard to prices, we believe the time is at hand when this system of disposing of our vineyard products will bring the raisin growers of this State to poverty and financial ruin.

"Now, therefore, in view of the facts above stated, we, the undersigned raisin growers, do most earnestly request, as a matter of protection to ourselves and families, even demand, that the packers who are producers of raisins, and packers who are not producers of raisins, and in fact all who have raisins in proper condition for the markets of the world, join together immediately and agree among themselves to establish a minimum price on each and every grade of raisins, and that they bind themselves not to sell any raisins during this present crop year for less than such minimum price agreed upon. And in consideration of such an agreement as above, we, the undersigned raisin growers, hereby agree and mutually bind ourselves upon our honor not to give, sell, or consign any raisins subject to our control, during the term above mentioned, to any party or parties who do not enter into our agreement establishing such minimum prices."

This agreement was afterward circulated among raisin growers of other counties and signed by a large number. A minimum price of 4½ cents per pound in the sweat-box was agreed upon.

When the association was organized it found a very large portion of the raisins of the State had been this year, as in 1891, contracted and assigned to the packer, to be sold by him on commission for the grower. The grower had signed an iron-clad agreement, with the packer which enabled him, the packer, to dispose of these raisins at whatever price he might see fit.

One of the first duties of the association was to ascertain at what prices these commission packers were selling the growers' raisins in the Eastern market. About the middle of August it was reported that raisins were being sold by many of the California packers in the markets of New York, Chicago, and Boston at prices that would net the grower considerably less than 4½ cents a pound. Having in mind the deplorable slaughter of raisins last year, the committee of this association caused telegrams to be sent to many brokers in the Eastern States asking for quotations and the names of firms who were quoting prices. The result was that nearly all the packing houses and some of the coöperative societies of the State were found cutting prices.

In answer to the earnest remonstrance of the association, and also with regard to the fact that the indignant grower, when informed of this state of affairs, in many instances intimated his intention to disregard his contract and refuse to deliver his raisins to the packer who was thus slaughtering prices, the Executive Committee of this association felt that the association was strong enough to say to the packers: "This competition among yourselves in the Eastern market, at the expense of the grower, must now and forever cease, and we are strong enough, as an association, to stop your slaughtering of prices. Those of you who refuse to come into the association we are able to render powerless for evil by refusing to give you our raisins to handle."

On the 17th of August last about two hundred of the growers of the State, members of the association, assembled in general meeting in Fresno. At this meeting the Executive Committee reported that eighteen out of the twenty-two of the principal packers and coöperative raisin packing companies of the State had agreed to stop this competition among themselves. This meeting was addressed by Mr. Williams, of the firm of Williams, Brown & Co., and Mr. Lemcke, of the firm of Schact, Lemcke & Steiner, and the result was embodied in the following resolutions:

WHEREAS, One thousand one hundred and thirty-five growers of raisin grapes, representing 41,796¼ acres of bearing vines, have signed the growers' agreement and joined this State Raisin Growers' Association, and are pledged upon the honor of each to stand together to protect the mutual interests of all growers; and whereas, we, the California State Raisin Growers' Association, in general meeting assembled, representing over 95 per cent of the raisin acreage of the State, have listened to the remarks before the convention by Mr. Williams, of Williams, Brown & Co., who also claimed to represent the firm of Cook & Langley, and the remarks of Mr. Lemcke, of the firm of Schact, Lemcke & Steiner; therefore, be it

Resolved, That in our opinion the manner of conducting the raisin business as expounded by the above-named packers is prejudicial to the best interests of the raisin growers, and tends to reduce the price of raisins; further

Resolved, That as long as these firms remain outside of the packers' organization, and refuse to sign the agreement of the other packers of the State, to maintain minimum prices, that we, the California State Raisin Growers' Association, further bind ourselves neither to sell them our raisins or do business with them in any way; and be it further

Resolved, That we express our thorough disapprobation and contempt of those firms who are operating in a way that will bring ruin to the raisin industry of the State.

As a result of such resolutions and the action of the association, nearly all the packers and coöperative raisin packing companies of the State fell into line, and agreed to observe the following prices, which prices are calculated upon a basis that will pay the grower 4½ cents per pound in the sweat-box for all good raisins, both of the first and second crop:

Clusters, 20 pounds	$2 00 per box.
3-Crown London layers	$1 65 per box.
2-Crown London layers	$1 45 per box.
3-Crown fancy loose, faced	$1 45 per box.
3-Crown fancy loose, unfaced	$1 40 per box.
3-Crown loose, boxed	$1 25 per box.
4-Crown loose, sacked	5½ cents per pound.
3-Crown loose, sacked	5 cents per pound.
2-Crown loose, sacked	4 cents per pound.
Seedless Muscats	5 cents per pound.
Seedless Muscats, fancy	5½ cents per pound.

The above are the minimum prices.

The only dissenting packers, whose pack could in any way affect the market, were Cook & Langley, Schact, Lemcke & Steiner, and Williams, Brown & Co. Messrs. Williams, Brown & Co., though refusing to sign, wrote to the association that it was their intention honestly to observe combination prices until further notice. The packers and the merchants, both here and in the East, are now reporting that they expect the raisin pack of this season, if properly handled, to bring a higher price than ever before known in the State, owing to the fact that the short crop of fruit in the East has so increased the price of dried fruit that raisins will, to a great extent, be used as a substitute.

As proof of the improved market which has been called into existence by the packer and grower agreeing upon one uniform price, many of the packers state that they have sold at the combination price all the first crop of raisins controlled by them. The Executive Committee of this association feel that this encouraging state of affairs is due entirely to the action taken by the association, backed by the firm attitude taken by 95 per cent of the growers of the State, members of the association refusing in any way to sell, or to do business with those packers who decline to sign the agreement to keep up prices.

THE WALNUT.

The walnut has been growing in favor the past few years, especially in the southern portion of the State, where sections are found in which soil and climate seem especially adapted to its growth. There are now 15,120 acres devoted to walnut growth in the State, of which 6,728 are in bearing and 8,392 not bearing. The principal walnut sections of the State are found around Rivera, in Los Angeles County, and in Ventura County. The trees there do phenomenally well, bear at a comparatively early age, and yield very large returns. The Los Nietos and Ranchito Walnut Growers' Association, whose members are all growers of the Rivera section, has been for several years the principal shipper of the walnut crop.

The crop of 1890, handled by this association, representing the product of forty-seven growers, amounted to 761,019 pounds (6,536 sacks), for which was received $59,611 84.

The crop of 1891 (fifty-one growers) was 702,469 pounds (6,619 sacks), and brought $58,020 83.

In addition to the above, growers not members of the association raised and shipped walnuts in amount and value equal to about 25 per cent of the association's shipments.

This year upwards of ninety growers have joined the association, and with the big harvest and increased acreage of young groves coming into bearing, the yield and receipts for the crop of 1892 are largely in excess of previous years.

In October of the present year a special train of twenty cars, loaded with English walnuts, with an average of 20,000 pounds to the car, a total of 400,000 pounds, was taken by the Atchison, Topeka, and Santa Fe Railroad. The value of this freight is about $2,000 a car, and the tariff for transit to market will be about $400 a car. The nuts were bought of the Los Nietos Walnut Association by the Germain Fruit Company, to be sent to various Eastern cities.

C. A. Coffman, of Rivera, a prominent walnut grower, and authority on the cultivation of that nut, gives the following rules for the propagation and cultivation of the walnut:

"The first matter to be considered is the soil. I think a deep alluvial deposit, with little or no alkali, is best adapted. It requires good drainage, any subsoil which is impervious to water being objectionable; water standing around tree roots is hurtful, causing sour sap, and in time killing the tree; it is especially so if impregnated with alkali or mineral salts. I consider a depth of less than 10 feet to water objectionable; from 12 to 14 feet is better.

"I do not think the fogs a detriment to walnut growing, as our finest nuts are grown near the coast, where fogs are of frequent occurrence.

"In planting, trees should be put at least 50 feet apart, and I think 55 or even 60 feet is better. I have seen trees planted 40 feet apart, and after they had attained about twenty years, the branches overlapped to such an extent as to injure the fruitfulness of the tree, and it became necessary to remove some of them.

"I think soft-shells might be planted 30 by 50 feet, and when about sixteen years old remove each alternate one, thus leaving the trees 50 by 60 feet apart. The soft-shell commences bearing at five years of age, and from that time until sixteen years of age a tree ought to produce a total of 1,000 pounds of nuts. Or the trees could be taken out at twelve years and transplanted to good advantage. As I have said, the soft-shell commences bearing at five years; at ten years they are at full bearing, that is, the tree is fruited to its utmost capacity. Of course the tree keeps on growing for a number of years, and the larger the tree the more walnuts it will produce. I consider this by far the best variety, as the tree is thrifty, a good grower and bearer, fruit superior, and commands a better price in market than the hard-shell. The leaves also drop later, so that it makes gathering the crop more convenient, as the nuts are allowed to fall and then picked from the ground.

"This year we sold soft-shells at 8½ cents, hard-shells at 7½, and paper-shells at 9 cents per pound.

"The paper-shell trees are dwarfs, and the nuts small and hard to hull. I think, however, they might be made profitable by planting them by themselves and putting more to the acre.

"In gathering the crop the nuts should not be allowed to remain too long on the ground after falling, as the fog and sun are injurious to them, causing the shell to burst open, turning the nut black, and exposure to the sun causes the nuts to become oily and rancid.

"I think they should be gathered at least three times during the month or six weeks that they are falling. At the last gathering the tree should be shaken by means of a pole with crotch and hook.

"The hard-shell is not nearly so susceptible to the action of sun and fog as is the soft-shell. In our section we have never been troubled with the hull sticking on the soft-shell, nor on the hard-shell to any extent. Perhaps one half of one per cent are unsalable on account of hulls sticking. In curing we use shallow trays, about 4 by 6 feet and 6 inches deep. These trays hold about one sack of nuts (110 pounds), have lath bottoms and handles at each end, which are taken by two men and thoroughly shaken; this allows the fiber and dirt to escape. They are then put through the grader. This has a sieve with inch meshes, and all nuts which are small enough to pass through this sieve are second-grade, and sell in the market for 2 cents per pound less than first-grade. Hard-shells from old trees give 5 or 6 per cent of second-grade nuts. The soft-shell trees are younger, as we have only recently commenced planting them. So far the second-grade soft-shells will not exceed one half of one per cent. Soft-shells should be cured in the shade, by spreading on a floor or in trays; they should not be spread over a foot in depth, should have an airy place, and will cure in a few days, especially if they have been allowed to fall from the trees. Hard-shells can be cured in the sun, as they will not open when exposed to its influence, as does the soft-shell; but I question the propriety of curing any kind in the sun, as I think it starts the oil in the nuts, causing them to taste rancid.

"In pruning, I think 4 or 5 feet from the ground high enough. It has been the custom to prune as high as 6 or 7 feet, in order to cultivate the ground underneath. I consider it detrimental to the tree, from the fact that it causes it to lean, thus exposing the south side of the tree to the sun and causing it to become sunburned. In pruning grown trees I should not trim the south side at all unless the branches interfered with each other; it is well to trim on the north side in order to balance up the tree, as they always lean toward the north. Nursery trees might be pruned to good advantage by cutting the tops off, thus preventing them from growing so tall and bending over.

"In cultivating the young trees it might be well to plow an ordinary depth of 4 to 5 inches, but with the older trees the roots should be allowed to come to the surface; a cultivator or even a sweep might be used.

"Land which requires fertilizing I should not consider good for walnuts at all."

THE ALMOND.

Much attention is being directed to almond culture in the State, and 10,333 acres are devoted to the growth of this nut. Of this amount 4,260 acres are in bearing, and the remainder, 6,073 acres, consists of young orchards.

That there is yet ample room for our almond growers in the home market, is proved by the fact that for the fiscal year ending with June 30, 1891, there were imported into the United States 6,812,061 pounds of almonds, valued at $931,007, and this was increased the following year to 7,629,392 pounds, valued at $1,028,671. Here are a million dollars now annually sent abroad that should go into the pockets of the California orchardists. The California output of almonds in 1889 was 22½ carloads; this decreased in 1890 to 10 carloads, the decrease being due to late rains which, coming at the time the trees were in bloom, prevented perfect pollenation of the blossom. In 1891 the output reached the normal condition, and with the new orchards which came into bearing that season reached 25 carloads.

For the present season the yield has been up to the average, and a large number of new orchards have come into bearing for the first time this season; and while at the present time there are no means of arriving at the exact quantity of the crop, it will probably be largely in excess of that of last season.

Prices for almonds vary but little, and are now quoted as follows:

Soft-shells	12¾ to 13 cents.
Paper-shells	14 to 15 cents.
Hard-shells	5½ to 6½ cents.

OTHER NUTS.

Among nut-producing trees of the State the chestnut ranks next to the walnut; but while considerable attention has been paid to its culture, and some extensive areas are devoted to its growth, it has not yet assumed any great commercial importance. The tree does well over the greater portion of the State. It is adapted to heavy, clayey soils, and in California grows rapidly. The chestnut is principally grown in most of the southern counties, although it is found to some extent in nearly all the fruit counties of the State.

Pecans, filberts, and black walnuts are cultivated to some extent, and give good returns, but cut no figure in a commercial sense. Peanuts are also cultivated in considerable quantities, especially around Tustin, in Orange County, where their growth has become an important branch of horticulture.

Of native nuts, the hazelnut and pine nuts are foremost, the product of the latter forming no mean figure in the natural productions of the State.

SMALL FRUITS.

The crop of berries and currants this season was fully up to the average, prices were good, and the demand increasing. Considerable new land has been set, especially to blackberries and raspberries, which do well in most parts of the State, while currants and gooseberries are confined to limited areas, the hot weather of the interior not agreeing with their requirements.

A floating item to the effect that the wild Honey strawberry of the Sierra was being domesticated, drew from S. L. Watkins, of Grizzly Flat, the following statement concerning this fruit:

"I am glad to learn that the Honey strawberry, a species of *Fragria chilensis*, is being extensively tested. From what I can see and learn of them they are a very superior berry.

"Last season I first became acquainted with the Honey strawberry, and when I first saw them I was greatly surprised at their immense productiveness. The Honey strawberry is oblong in shape, and in color a beautiful, glowing red. They are exceedingly sweet, juicy, aromatic, and delicious, melting in the mouth, without a particle of hard core. The berries are not what might be termed large, but by greater cultivation the berries can be made to average three fourths of an inch in length. This season I noticed Honey strawberries that were an inch and a half in length and half an inch in diameter at the base. I have counted sixty-five ripe berries on a single plant at one time, and found numerous young shoots loaded with blossoms, and all sizes of young berries. This plant was no exception, as surrounding plants equaled it. In addition, these Honey strawberries are ever-bearing, and yield their greatest crop of fruit during July, August, and September, after all other varieties are gone.

"The Honey strawberry somewhat resembles the red Alpine of Switzerland, which is extensively cultivated there.

"I have learned of the following different varieties of foreign Alpines: The red and white Alpines, the berries are oblong in shape, splendid bearers, small, very sweet, juicy, aromatic, and delicious; succeed well with very trifling care. The red and white Wood strawberry is the wild strawberry of Europe, and is one of the easiest of cultivation; berries are round, very sweet, and delicate of flavor, and one of the most desirable kinds. The red bush Alpine and white bush Alpine are remarkable for their total destitution of runners, and are propagated by dividing the roots. This variety of Alpines is valuable for border plants, small gardens, etc. They grow in close, compact bunches; berries are conical in shape, quality excellent, and are very abundant bearers. Green strawberries are closely allied to the red and white Wood strawberries, and are remarkable for their rich, pineapple flavor.

"To sum up, the Alpine and Wood strawberries are noted for their bearing qualities, coloring, delicious sweetness, and hardiness. As their main fruiting season comes after most common varieties are gone, it is a good point in their favor. Even if the berries are small, they bear so abundantly and the quality is so superior that they make up that way for size."

DRIED FRUITS.

The demand and prices for dried fruit this season have been greater than since 1890, and very good prices have been received by our driers for their product. The unnaturally high prices of 1890, when bleached unpeeled peaches advanced in one week from 13 to 22 cents per pound, and dealers were frantic in their efforts to purchase, brought about a natural reaction in 1891, when prices fell so low as to leave no profit for the drier. This was caused by the fact that the Eastern jobber moved cautiously and purchased lightly. This condition did not last long, however, for the stock of dried fruit in the market was soon exhausted, and prices gradually advanced, and the early spring of 1892 found a depleted market. Prices started comparatively low early in the season, but as it was discovered that there was no stock on hand, they rapidly advanced until dried apricots and peaches, which form the staple articles of our dried fruit products, were quoted as follows:

Good apricots	12½ to 13½ cents.
Extra apricots	13 to 14 cents.
Fancy apricots	15 to 17 cents.
Unpeeled peaches, good	12½ to 13 cents.
Unpeeled peaches, fancy	13 to 14 cents.

Efforts were made during the season to force the market for the new crop of dried fruits to lower prices, but they were not successful, and the demand unquestionably warranted the high prices. The returns from the greater part of the Eastern States indicate a short fruit crop there, and renders it certain that California will have to supply the bulk of the dried fruit output. The dried fruit crop will average about 65 per cent of that of 1891, but the quality is much better than that of last year.

The short fruit crop abroad, particularly of pears in France and tree fruit in Great Britain, will create a large demand on this country for canned and dried fruit, and as the crop of canning fruit, and also of apples and other fruit for drying, is short, the East will not be able to meet its own wants, let alone supply any of the requirements from foreign countries, and consequently California fruit will have to be taken. To show the foreign demand, we will state that for the fiscal year ending June 30, 1892, there were exported by the United States, of dried apples, 26,042,063 pounds, and green or ripe apples, 938,743 pounds. There were also exported, of canned fruit, $1,558,825, and other green, ripe, or dried fruit, $131,682. These statistics show that European and other foreign countries draw heavily from us, even when the crop abroad is an average; and with a shortage abroad, what would they take, provided it could be had?

One of the heaviest handlers and shippers of dried fruit, in speaking of the future of this industry, says:

"There is not, neither will there be, a glut in the dried fruit market. During the past year there has been so much territory opened to our fruits that the entire supply will be exhausted much earlier than it was last season. Prices range high now, and will be much higher in a month or two.

"The dried fruit business, like that of the green fruit, is yet in its infancy here. Every year we discovered so much about the needs of the trade, and improved methods in evaporating and drying, that twelve months hence we will conclude we knew nothing about the business. We are feeling our way, as it were, and learning our customers. We discover that the very same grade of a certain fruit has a slow sale in bags, when in 10 and 25-pound boxes it goes quite readily. In another part of the country we find the very reverse true. Merchants often write to us and ask to have their fruit packed in white cotton bags; others in boxes of various weight. Still another class of merchants prefer to have their fruit shipped to them in bulk, and they themselves grade and pack it as they think will best meet the approval of their trade.

"There is much more in this than most people suppose. What the fruit grower should aim at is quality, and a first-class article having been secured, there will be little trouble about price. The packing, while of great importance, is secondary to this, and undoubtedly the time is not far distant when growers will either not pack at all, or do so at the order and under the direction of the buyer.

"For the English market it is well known that boxes of about 25 pounds are preferred, and they must be packed with the finest paper and attractive lithographs. A box of fruit packed plain, without decoration, will not sell there at all. That in bags could not be given away. Apricots, pears, and now even raisins will sell well if half of the expense of the package is put in the box and fancy papers.

"The orchardist who plants drying fruit has a sure thing. Green fruit may find its market limited when all of California's broad acres are covered with fruit trees, but dried fruit never. It can be sent to the remotest parts of the world, and the increased supply will only increase the demand.

"The industry has a bright future, and many farmers are showing their good judgment by investing liberally in drying fruits. The dried peaches, prunes, pears, apricots, nectarines, apples, raisins, and plums shipped from Sacramento daily amount to many thousands of pounds.

"The raisin market is somewhat dull, but our goods will all go at fair prices. The movement of raisins from this State so far this season is only about 50 per cent of the amount shipped to same date last year. Trading is very light and mostly with points west of the Missouri River. It is reported that many early orders have been canceled and some shipments rejected.

"The Fresno combination is still firm in holding for schedule prices, however. From the 21st of September to the 13th of October, 485,500 boxes (28 pounds per box net weight) of Valencia raisins passed Gibraltar, Spain, for New York."